



WORKSHOP MANUAL

**1985
TROOPER II
(KB82)**

ISUZU

QUICK REFERENCE CHART: TROOPER II 1985

REFILL CAPACITIES

Unit		Liter	US Measure
Engine oil	with filter change	3.5	3.7 US quarts
	without filter change	3.1	3.3 US quarts
Transmission (with transfer)		2.5	5.3 US pints
Axle	Front	1.0	2.1 US pints
	Rear	1.5	3.2 US pints
Coolant	Approx.	8	8.5 US quarts
Power steering		1.0—1.2	2.1—2.5 US pint
FUEL TANK		50	13.2 US gallons

WHEEL ALIGNMENT

Toe-in	mm(in.)	0 ± 2 (0.08)
Camber		35'
Caster		30'
Kingpin inclination		7°25'

Engine G200Z

Ignition timing B.T.D.C. °/rpm	Federal	6°/800
	California	6°/900
Firing order		1-3-4-2
Valve clearance (when cold)	Intake	0.15mm (0.006 in.)
	Exhaust	0.25mm (0.010 in.)
Spark plug	TYPE	BPR 6ES-11
	Plug size	M14, P = 1.25mm (0.05in.)
	Spark gap	1.05mm (0.04in.)
Generator		12 — 50A
Starter motor		12V — 1.2 kW
Battery		12V — 50AH (50D20R)

TIRE & WHEELS

Tire size	P225/75R-15
Disc wheel size	6JJ x 15
Tire pressure kg/cm ² (psi)	1.8 (26)
Wheel nut tightening torque kg-m(ft.lbs.)	8 — 11 (58 — 80)

BRAKE (FRONT & REAR)

Unit		mm(in.)
Pad	Replacement thickness	1.0 (0.039)
	Runout	Less than 0.13 (0.0051)
Rotor	Replacement thickness	16.6 (0.654)
	Parallelism : circum- ference direction	Less than 0.03 (0.0012)
Drum brake	Lining replacement thickness	1.0 (0.039)
	Replacement diameter	255.5 (10.059)
	Radial runout	0.15 (0.006)

AMERICAN ISUZU MOTORS INC.

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WORKSHOP MANUAL

TROOPER II (KB82)

FOREWORD

This manual includes special notes, important points, service data, precautions, etc. that are needed for the maintenance, adjustments, service, removal and installation of vehicle components.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication.

All rights are reserved to make changes at any time without notice.

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This manual applies to 1985 models.

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13	ACCESSORIES
APPENDIX A	CONVERSION TABLES

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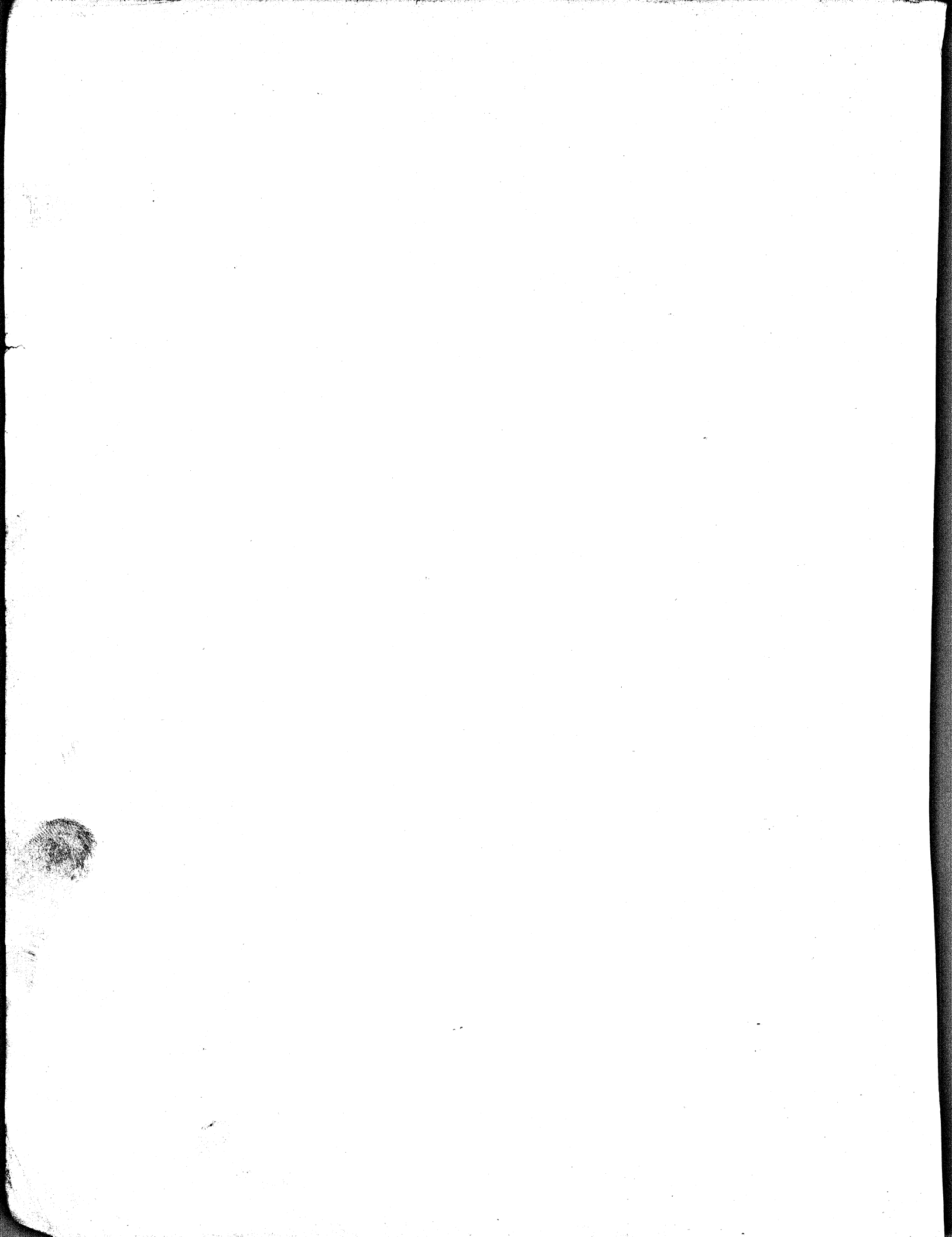
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SECTION 00

GENERAL INFORMATION

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GENERAL REPAIR INSTRUCTIONS

1. If you are using a floor jack, always take the proper precautions to protect yourself from serious personal injury. Park the vehicle on level ground. Block either the front or rear wheels. Carefully set the jack in the proper position against an axle or the frame.
Raise the vehicle and then support it with chassis stands. Then you can safely perform necessary service operations.
2. Before performing any service operation, always disconnect the battery ground cable. This protects other essential electrical cables from damage or burning due to accidental short circuiting.
3. Always cover the vehicle body, seats, and floor to protect against damage and dirt.
4. Brake fluid and anti-freeze solution must be handled with care. If these fluids are spilled on painted surfaces, damage will result.
5. Always use the proper tools for the job at hand. Where specified, use only an ISUZU SPECIAL TOOL.
6. Always use genuine ISUZU PARTS.
7. All used cotter pins, gaskets, O-rings, oil seals, locking washers, and self locking nuts removed during any service operation should be replaced with new ones. Always discard the old ones. Do not reuse them.

00-2 GENERAL INFORMATION

8. Always keep disassembled parts neatly in groups.
Be sure to keep attaching nuts and bolts carefully separated. This is especially important as these nuts and bolts vary in hardness and design depending upon their installation position.
9. Clean and inspect all parts before reassembly. Use compressed air to blow oil ports free of all obstructions.
10. Lubricate the rotating and sliding faces of all parts with oil or grease before installation.
11. Where necessary, use a sealer on gaskets to prevent leakage.
12. Carefully observe all nut and bolt torque specifications.
13. After completing any service operation, make a final check to be sure that the service has been properly performed and that all problems have been corrected.

HOW TO USE THIS MANUAL

1. Find the type of unit or equipment to be serviced by referring to the "Application chart" or "Identification of unit or equipment" included in this section.
2. Find the applicable section by referring to the index.
3. This manual includes a "General information" section in which service data, maintenance items and specifications with torques are included.
4. Each section includes Removal and Installation, Disassembly, Inspection and Repair, and Reassembly. When the same service operation applies to more than one units, or equipment, a notice is inserted stating, "Refer to manual for other units or equipment".

5. Each service operation section begins with a disassembled view of the unit or equipment. This is useful for finding components, service procedures, availability, and content of repair kits.

GASOLINE ENGINE 01-19

CYLINDER BODY AND TIMING MECHANISM

Disassembly steps-2

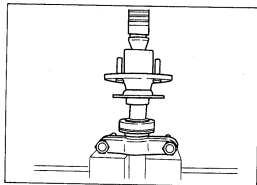
9. Plate, spacer, and fan puller 10. Oil pan and gasket ▲ 11. Oil pipe 12. Crank pulley 13. Boss ; and bolt 14. Front cover assembly with water pump and oil pump 15. Pinion ; oil pump 16. Timing chain 17. Camshaft sprocket 18. Timing wheel ; crankshaft 19. Oil jet 20. Timing chain guide 21. Timing chain tensioner	22. Automatic adjuster 23. Washer ; flywheel 24. Flywheel for model with manual transmission 25. Under cover 26. Rear plate 27. Rear oil seal retainer 28. Caps ; connecting rod with bearings 29. Piston and connecting rod with bearings 30. Caps ; crankshaft with bearings 31. Crankshaft assembly 32. Thrust washer 33. Bearings ; crankshaft 34. Cylinder body assembly
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- ★ Parts contained in repair kit.
- Parts to be removed or installed as a unit.
- All units or parts within a frame are to be considered as a "major component". Each unit or part within a frame is to be considered as a "minor component".
- The number shows the sequence of the service operation.
- Removal of parts without numbers (excluding bolts, nuts, washers, gaskets, cotter pins, etc.) is unnecessary unless replacement is needed. Where parts replacement requires a specific note, instructions are given in "Inspection and Repair".
- ★ Indicates repair kit availability.
- Name of parts listed in sequence of service operation.
- ▲ Indicates an important operation. Details of the service operation are described in the paragraph "Important Operations".

00-4 GENERAL INFORMATION

6. The section following the illustration(s) deals with important service steps marked with "▲".
This section also includes "notes", "use of special tools", and "service data".

07-24 PROPELLER SHAFT AND AXLE



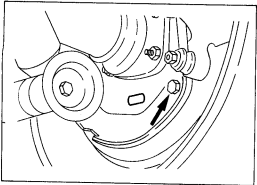
Important operations

3. Bearing ; rear axle shaft

4. Sleeve ; rear axle

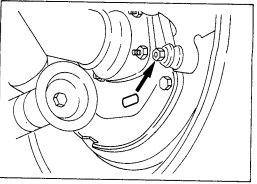
Install the O-ring on the outer circumference of the outer race.
Install the bearing with the O-ring turned to splined end of the axle shaft.

Install the sleeve with the flanged side facing toward ball bearing.
Use a bench press for installation.
Installer : J-22912-01



8. Bolt ; plate to axle housing

Torque	kg-m(ft.lbs.)	3.6 - 4.0 (26 - 29)



10. Caliper assembly

Torque	kg-m(ft.lbs.)	4.8 - 5.2 (35 - 38)

Item shown in the illustration and marked with "▲".

Special tools are identified with the tool name and/or tool number.
The drawing shows how the tool is used.

Important note.

This symbol indicates the service steps to be followed.
Refer to the following paragraph for the meaning of each symbol.

Service data and specifications are listed in the table.

7. In this manual, the following symbols are used to indicate the type of service operations to be performed.

	 Remove		 Adjustment
	 Install		 Clean
	 Disassemble		 Pay close attention — important
	 Reassemble		 Tighten to specified torque
	 Align the marks		 Use essential tool(s)
	 Correct direction		 Use available tool(s)
	 Inspect		 Lubricate with oil
	 Take measurement		 Lubricate with grease

8. The service standard is indicated in terms of "Standard" and "Limit".
The "Standard" means the assembly standard and standard range within which the parts are considered serviceable.
"Limit" indicates the limit value (Correction or replacement is necessary when measurement is beyond this limit.)
9. In this manual, the components and parts are printed in singular form.

TORQUE SPECIFICATIONS

STANDARD BOLTS

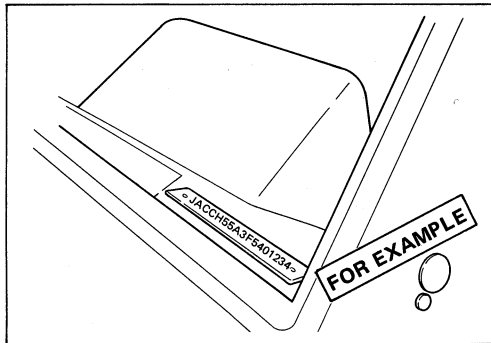
The torque values given in the following table should be applied when a particular torque is not specified.

kg-m (ft. lbs.)

Bolt identification Bolt diameter x pitch (mm)			
	4 T (Low carbon steel)	7 T (High carbon steel)	9 T (Alloy steel)
M 6 x 1.0	0.4 — 0.8 (3 — 6)	0.5 — 1.0 (4 — 7)	—
M 8 x 1.25	0.8 — 1.8 (6 — 13)	1.2 — 2.3 (9 — 17)	1.7 — 3.1 (12 — 22)
M10 x 1.25	2.1 — 3.5 (15 — 25)	2.8 — 4.7 (20 — 34)	3.8 — 6.4 (27 — 46)
*M10 x 1.5	2.0 — 3.4 (14 — 25)	2.8 — 4.6 (20 — 33)	3.7 — 6.1 (27 — 44)
M12 x 1.25	5.0 — 7.5 (36 — 54)	6.2 — 9.3 (45 — 67)	7.7 — 11.6 (56 — 84)
*M12 x 1.75	4.6 — 7.0 (33 — 51)	5.8 — 8.6 (42 — 62)	7.3 — 10.9 (53 — 79)
M14 x 1.5	7.8 — 11.7 (56 — 85)	9.5 — 14.2 (69 — 103)	11.6 — 17.4 (84 — 126)
*M14 x 2.0	7.3 — 10.9 (53 — 79)	9.0 — 13.4 (65 — 97)	10.9 — 16.3 (79 — 118)
M16 x 1.5	10.6 — 16.0 (77 — 116)	13.8 — 20.8 (100 — 150)	16.3 — 24.5 (118 — 177)
*M16 x 2.0	10.2 — 15.2 (74 — 110)	13.2 — 19.8 (95 — 143)	15.6 — 23.4 (113 — 169)
M18 x 1.5	15.4 — 23.0 (111 — 166)	19.9 — 29.9 (144 — 216)	23.4 — 35.2 (169 — 255)
M20 x 1.5	21.0 — 31.6 (152 — 229)	27.5 — 41.3 (199 — 299)	32.3 — 48.5 (234 — 351)
M22 x 1.5	25.6 — 42.2 (185 — 305)	37.0 — 55.5 (268 — 401)	43.3 — 64.9 (313 — 469)
M24 x 2.0	36.6 — 55.0 (265 — 398)	43.9 — 72.5 (318 — 524)	56.5 — 84.7 (409 — 613)

An asterisk * indicates that the bolts are used for female-threaded parts made of soft materials, such as casting.

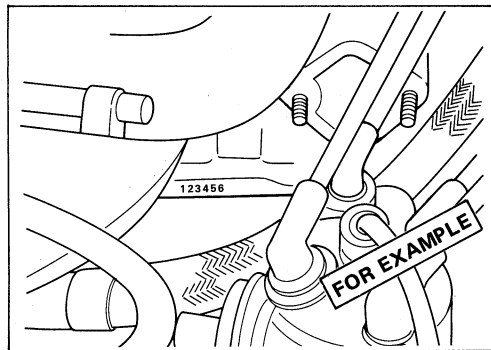
IDENTIFICATION



VEHICLE IDENTIFICATION

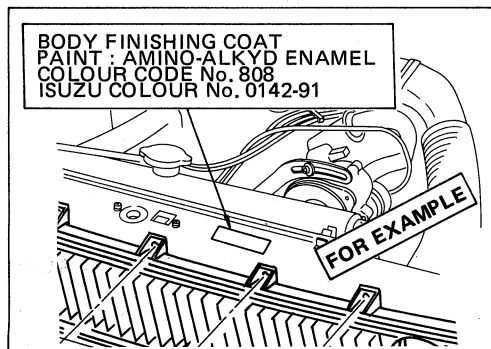
The vehicle identification number is embossed on a plate attached to the top left end of the instrument panel.

This number is visible and can be read through the windshield glass.



ENGINE SERIAL NUMBER

The gasoline engine number is stamped on the right upper center part of the cylinder body.

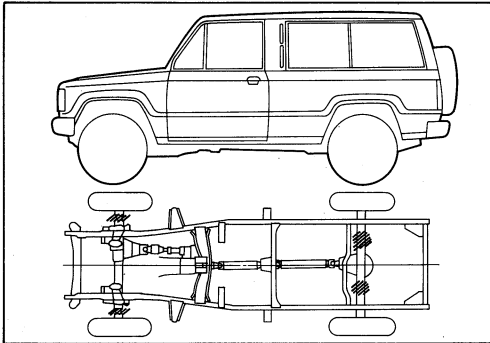


The paint color code identification plate is located in the engine compartment.

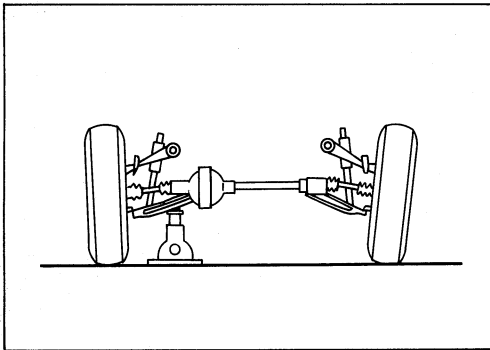
LIFTING INSTRUCTIONS

If a lifting device other than the original jack is used, it is most important that the device be applied only to the correct lifting points (illustration). Raising the vehicle from any other point may result in serious damage.

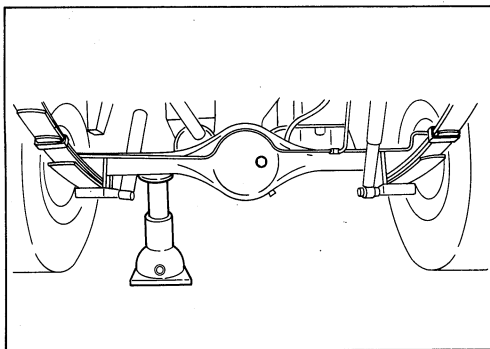
JACK



Jacking points

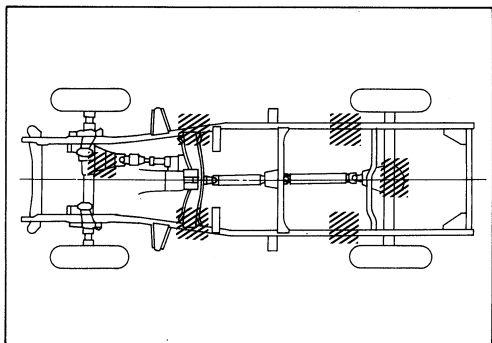


Lower control arm



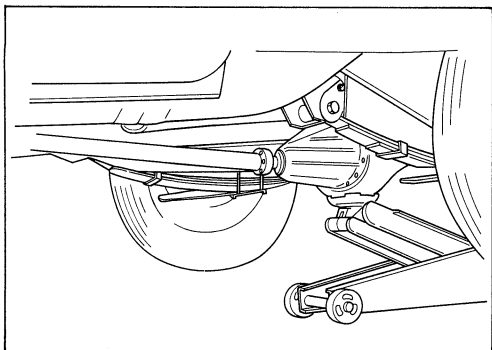
Rear axle

GARAGE JACK AND SAFETY STANDS

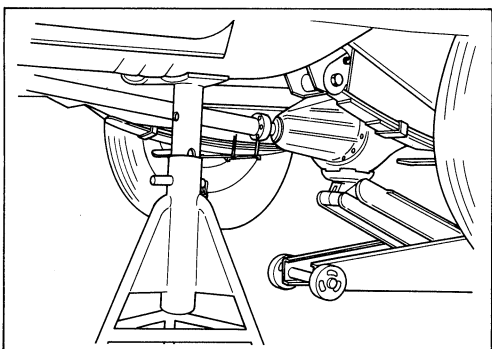


Lifting points and supportable point-locations

1. Front axle center
2. Rear axle center
3. Side frame

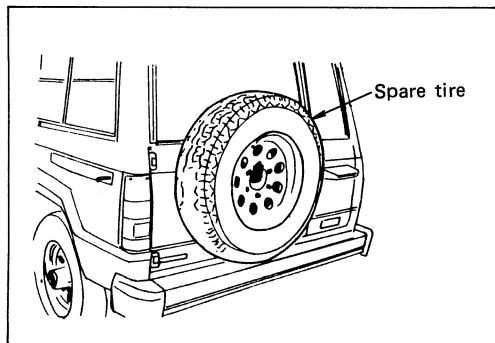


Supportable points

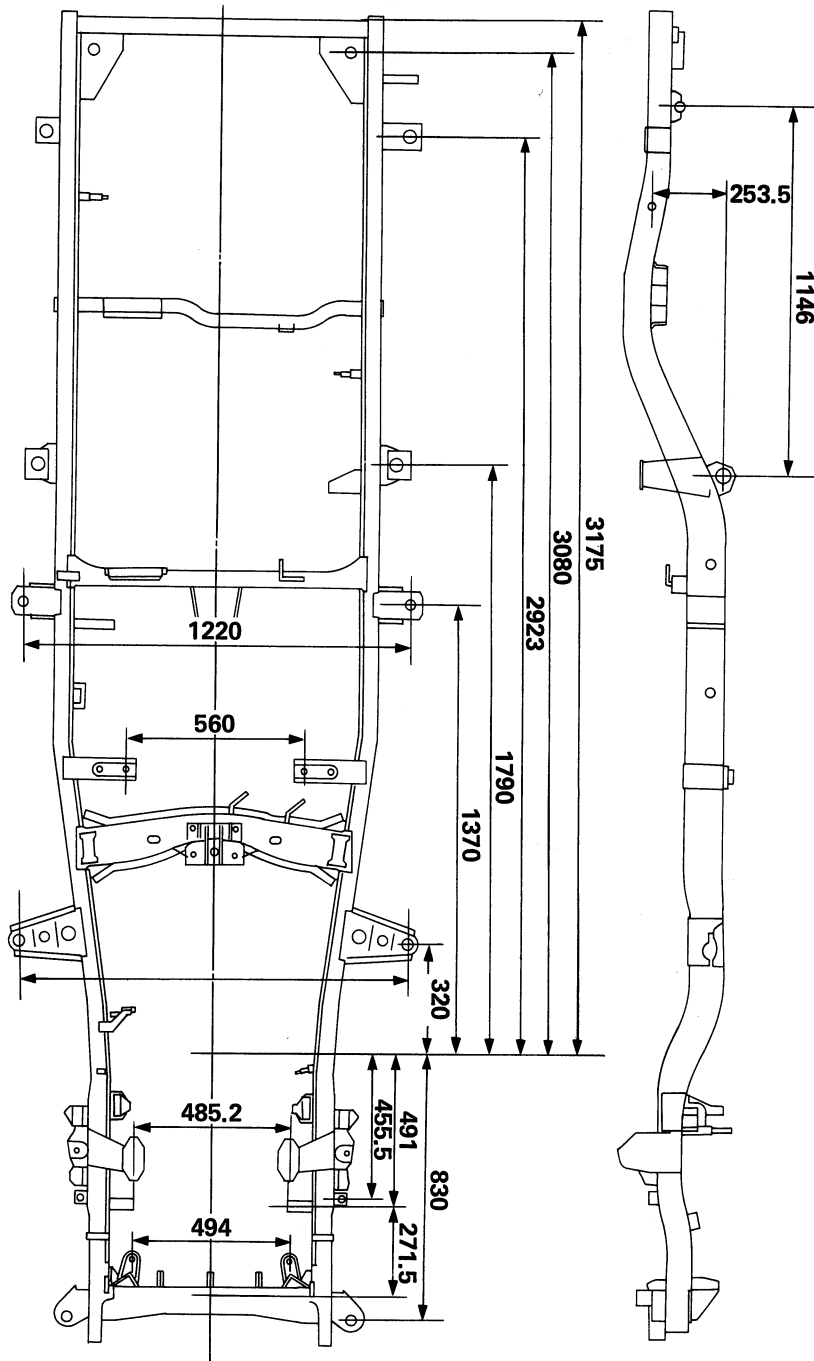


SPARE TIRE

The spare wheel and tire is mounted on the left hand rear door.



UNDER BODY MEASUREMENTS DIAGRAM



MAINTENANCE AND LUBRICATION

COMPLETE VEHICLE MAINTENANCE SCHEDULE

		IN THOUSANDS OF MILES (USE ODOMETER READING)											
Item No.	MILEAGE ONLY ITEMS	5.0	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	
1	ROTATE TIRES AND ADJUST TIRE PRESSURE												
2	CHANGE FRONT & REAR AXLE LUBRICANT												
3	CHANGE TRANSMISSION & TRANSFER CASE LUBRICANT												
4	REPLACE SPARK PLUGS												
5	REPLACE AIR CLEANER ELEMENT												
6	REPACKING LUBRICANT; FRONT WHEEL BEARINGS												
7	REPLACE FUEL LINE FILTER (Except California)												
8	CHECK & ADJUST VALVE CLEARANCE												
9	CHECK SPARK PLUG & COIL WIRES (Except California)												
10	REPLACE POWER STEERING RUBBER HOSES												
11	CHANGE POWER STEERING FLUID												
12	CHECK THERMOSTATICALLY CONTROLLED AIR CLEANER (Except California)												
13	ADJUST ENGINE IDLE SPEED (Except California)												
	ADJUST ENGINE IDLE SPEED (California Only)												

Item No.	MILEAGE/MONTHS Whichever comes first	OR MONTHS EVERY	IN THOUSANDS OF MILES (USE ODOMETER READING)										
			7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	
14	* OWNER SAFETY CHECKS	12											
15	LUBRICATE BODY & CHASSIS												
16	CHECK FLUID & LUBRICANT LEVELS												
17	CHECK FRONT & REAR PROPELLER SHAFT												
18	CHECK SUSPENSION & STEERING												
19	CHECK TIRES, WHEELS, & DISC BRAKES												
20	CHECK BRAKE LINES & HOSES												
21	CHECK EXHAUST SYSTEM												
22	CHANGE ENGINE OIL												
23	CHANGE ENGINE OIL FILTER												
24	CHECK & LUBE BRAKE & CLUTCH PEDALS												
25	CHECK DRUM BRAKES & PARKING BRAKES												
26	CHECK & CLEAN COOLING SYSTEM												
27	INSPECT FUEL CAP, LINES, & TANK												
28	CHECK THROTTLE LINKAGE												
29	CHECK BUMPERS												
30	LUBE FRONT & REAR PROPELLER SHAFTS												
31	CHECK STEERING GEAR	12											
32	CHECK CARBURETOR CHOKE & HOSES	24											
33	CHECK DRIVE BELTS	24											
34	CHECK DISTRIBUTOR AND DISTRIBUTOR ADVANCE MECHANISM (Except California)	24											
35	CHECK AIR INJECTION REACTOR SYSTEM (Except California)	24											
36	AIR CONDITIONING SHOULD BE CHECKED EVERY 12 MONTHS.												

* OWNER SAFETY CHECKS ARE EXPLAINED ON FOLLOWING PAGES.

EXPLANATION OF COMPLETE VEHICLE MAINTENANCE SCHEDULE

The following is a brief description of each of the services listed in the preceding Complete Vehicle Maintenance Schedule.

NORMAL VEHICLE USE

The owner's maintenance instructions in this Maintenance Schedule are based on the assumption that your car will be used as designed:

- to carry passengers and cargo within the limitations specified on the tire placard located on the inside of the glove compartment door;
- to be driven on reasonable road surfaces within legal operating limits;
- to be driven on a daily basis, as a general rule, for at least several miles/kilometres;
- to be driven on unleaded fuel

Unusual or severe operating conditions will require more frequent car maintenance, as specified in the following sections.

1. ROTATE TIRES

To equalize wear, rotate tires and adjust tire pressures as indicated in the Owner's and Driver's Manual.

2. CHANGE FRONT & REAR AXLE FLUID

Replace the lubricant after the first 7,500 miles (12,000 km) and every 30,000 miles (48,000 km) thereafter. Change the lubricant every 15,000 miles (24,000 km) under severe operating conditions. Check the lubricant level every 12 months or 7,500 miles (12,000 km), whichever occurs first, and add lubricant to the level of the filler hole if necessary.

3. CHANGE MANUAL TRANSMISSION & TRANSFER CASE FLUID

Replace the lubricant after the first 7,500 miles (12,000 km) and every 30,000 miles (48,000 km) thereafter. Check the lubricant level every 12 months or 7,500 miles (12,000 km), whichever occurs first, and add lubricant to the level of the filler hole if necessary.

4. REPLACE SPARK PLUGS

Replace plugs at 30,000 mile (48,000 km) intervals.

5. REPLACE AIR CLEANER ELEMENT

Replace the engine air cleaner element during normal operation every 30,000 miles (48,000 km). Operation of the vehicle in dusty areas will necessitate more frequent element replacement. Your Isuzu Dealer or service facility can be of assistance in determining the proper replacement frequency for the conditions under which you operate your vehicle.

6. REPACK FRONT WHEEL BEARINGS

Clean and repack the front wheel bearings and lubricate the free wheel hubs at each brake relining or after 30,000 miles (48,000 km), whichever comes first. Use lubricant as specified in the "Recommended Fluids & Lubricants" chart.

7. REPLACE FUEL LINE FILTER (EXCEPT CALIFORNIA)

Replace filter at 30,000 mile (48,000 km) intervals or more frequently if clogged.



8. CHECK & ADJUST VALVE CLEARANCE

Incorrect valve clearance will result in increased engine noise and lower engine output, thereby adversely affecting engine performance. Retorque rocker shaft bracket nuts before checking and adjusting valve clearance. Check and adjust valve clearance every 15,000 miles (24,000 km).



**9. CHECK SPARK PLUG & COIL WIRES (EXCEPT CALIFORNIA)**

Check the exterior insulation of the plug and ignition coil wires for checking, burning, or cracking. The insulation around the distributor cap, coil, and spark plugs should fit tightly.

Clean the exterior of the wires and remove any corrosion from the end terminals.

Badly worn or damaged wires should be replaced.

**10. REPLACE POWER STEERING RUBBER HOSES (IF SO EQUIPPED)**

Replace power steering rubber hoses every 45,000 miles (72,000 km).

11. CHANGE POWER STEERING FLUID (IF SO EQUIPPED)

Change the power steering gear lubricant every 22,500 miles (36,000 km).

**12. CHECK THERMOSTATICALLY CONTROLLED AIR CLEANER (EXCEPT CALIFORNIA)**

Inspect to make certain that all hoses and ducts are connected and correctly attached. Also check the valve for proper operation.

**13. ADJUST ENGINE IDLE SPEED**

Adjust the engine idle speed at the intervals shown in the Maintenance Schedule List. Adjustments must be made with test equipment known to be accurate.

NOTICE: *For engine idle speed adjustments, follow the specifications shown on the label under the hood.*

**14. OWNER SAFETY CHECKS****Safety Checks to be Made by Owner or Driver****(1) Parking brake**

Park on a fairly steep hill and hold the vehicle with the parking brake only. This checks holding ability.

**CAUTION**

- *Before checking (2) or (3) below, be sure you have enough room around the vehicle. Then firmly apply both the parking brake and the regular brake. Do not use the accelerator pedal. If the engine starts, be ready to turn off the key promptly. Take these precautions because the vehicle could move without warning and possibly cause personal injury or property damage.*

(2) Starter safety switch

To check, place the shift lever in "Neutral", push the clutch halfway and try to start. The starter should not crank. The starter should crank only when the clutch is fully depressed.

(3) Steering

Be alert for any changes in steering action. Inspection or service is needed when the steering wheel is hard to turn or has too much free play or if there are strange sounds when turning or parking.

(4) Wheel alignment, balance and tires

Uneven or abnormal tire wear, or a pull to the right or left on a straight and level road may show the need for wheel alignment. A vibration in the steering wheel or seat at normal highway speeds means wheel balancing is needed. Check tire pressure when the tires are "cold" at least monthly and whenever the vehicle is serviced (include the spare).

(5) Brakes

Watch for the "Brake" light coming on. Other signs of possible brake trouble are such things as repeated pulling to one side when braking, unusual sounds when braking or between brake applications, or increased brake pedal travel. If you notice one of these conditions, have the system checked at once and repaired if needed.

(6) Exhaust system

Be alert to any changes in the sound of the exhaust system or any smell of fumes. These are signs the system may be leaking or overheating. Have it checked and/or repaired at once. (See also the "Engine Exhaust Gas Caution (Carbon Monoxide)" in Section 2 and "Catalytic Converter" in this section.

(7) Windshield wipers and washers

Check the operation and condition of the wiper blades. Check the flow and aim of the washer spray.

(8) Defrosters

Turn the control lever to "DEF" and the fan lever to "HI". Then check the air flow from the ducts at the inside base of the windshield.

(9) Rearview mirrors and sun visors

Check that the friction joints hold mirrors and sun visors firmly in place.

(10) Horn

Occasionally blow the horn with each button to be sure it works.

(11) Lap and shoulder belts

Check belt system, including the webbing, buckles, latch plates, retractors, guide loops, keepers and anchors for proper operation and damage.

(12) Seat adjusters

When adjusting the seat, be sure the seat adjusters latch by pushing the seat forward and backward.

(13) Seatback latches

Seatback latches are designed to prevent forward motion of the seatback when the vehicle slows suddenly. Check to see that seatback latches are holding by pulling forward on the top of the folding seatback.

(14) Lights and buzzers

Check the panel lighting and warning lights and the seat belt reminder light and buzzer. Check also the key buzzer and interior lights. On the outside, check the license plate lights, side marker lights, headlights, parking lights, tail lights, brake lights, turn signals, backup lights, and hazard warning flashers. Have headlight aim checked promptly if the beams seem improperly aimed.

(15) Glass

Check for broken, scratched, or damaged glass that could reduce vision or cause injury.

(16) Door latches

Check that all doors close, latch, and lock tightly.

(17) Hood latch

Check that the hood closes firmly. Check for broken, damaged, or missing parts that might prevent tight latching. Make sure the secondary latch keeps the hood from opening all the way when first released.

(18) Fluid leaks

Check for fuel, water, oil or other fluid leaks by looking at the surface beneath the vehicle after it has been parked for a while. Water dripping from the air conditioning system after use is normal. If you notice fuel fumes or fluid at any time, have the cause found and corrected at once.

(19) Spare and jack

Check that the spare tire and all jack gear are securely stowed at all times.

(20) Underbody

Corrosive materials used for ice and snow removal, and dust control, can collect on the underbody. If these materials are not removed, accelerated corrosion (rust) can occur on underbody parts such as the fuel line, frame, floor pan, and exhaust system. At least every spring, flush these materials from the underbody with plain water. Take care to thoroughly clean any areas where mud and other debris can collect. Sediment trapped in closed areas of the frame should be loosened before being flushed.

**15. LUBRICATE BODY & CHASSIS**

Lubricate the front suspension and steering linkage*. Grease fittings are located on the tie-rods, relay rods and ball joints. Also lubricate the parking brake* cables and linkage. Lubricate the transmission shift linkage.



Lubricate the hood latch and hinges and the tailgate latch and hinges every 12 months or 7,500 miles (12,000 km). Wipe off any accumulation of dirt or contamination on latch parts before applying lubricant. Perform an operation check after lubrication to assure that the hood latch and hinges are working properly.

16. CHECK FLUID & LUBRICANT LEVELS

Check the level of fluid or lubricant in the brake master cylinder*, battery, transmission and transfer case. Check the fluid level of the windshield washer reservoir*. Engine coolant should be checked for proper level and freeze protection to at least -20°F (-29°C) or the lowest temperature expected during the period of vehicle operation*. Proper engine coolant also provides corrosion protection.

Any significant fluid loss in any of these systems or units could mean that a malfunction is developing. Corrective action should be taken immediately. A low fluid level in the brake master cylinder reservoir(s) could also be an indicator that the disc brake pads need replacing.

17. CHECK FRONT & REAR PROPELLER SHAFT

Check the propeller shaft flange bolts for proper torque 2.4-2.7 kg-m (18-20 ft. lbs.).

18. CHECK SUSPENSION & STEERING

Check the front and rear suspension system. Look for damaged, loose, or missing parts and also for parts showing signs of wear or lack of lubrication. Replace questionable parts at once.

19. CHECK, TIRES, WHEELS & DISC BRAKES

During tire rotation, check the disc brake pads for wear. Check the surface condition of the rotors when the wheels are removed (see Item 1). Check the tires for excessive or abnormal wear or damage. Also check tire inflation pressures and adjust as shown on the certification label on the driver's door. Be sure the wheels are not bent or cracked and that the wheel nuts have been tightened to proper torque value and at the interval shown in the Owner's and Driver's Manual.

20. CHECK BRAKE LINES & HOSES

Check the lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Any questionable parts should be replaced or repaired at once. When rubbing or wear is noted on lines or hoses, the cause must be corrected at once.

21. CHECK EXHAUST SYSTEMS •

Check the complete exhaust system, including the catalytic converter. Check body areas near the exhaust system. Look for broken, damaged, missing, or out-of-position parts. Also, search for open seams, holes, loose connections, or other conditions which could cause a heat build-up in the floor pan, or could let exhaust fumes seep into the passenger compartment. Dust or water in the passenger compartment may indicate a leak in the area. Needed repairs should be made at once. To help maintain system integrity, replace the exhaust pipes and resonators rearward of the muffler whenever a new muffler is put on.

22. CHANGE ENGINE OIL •

Change at the interval noted below, depending upon driving conditions.

○ NORMAL SERVICE

Change every 7,500 miles (12,000 km) or every 12 months, whichever occurs first.

○ SEVERE SERVICE

Change every 3,000 miles (4,800 km) or every 3 months if you often drive under one or more of these conditions: (a) Dusty areas, (b) Towing a trailer, (c) Frequent idling or idling for long periods, (d) driving four miles (6 km) or less in freezing weather, or other short trips in cold weather, where the engine does not thoroughly warm up. Change the oil and filter as soon as you can after driving in a dust storm.

23. CHANGE ENGINE OIL FILTER •

Replace at the first and the second oil change and every other oil change thereafter.

**24. CHECK & LUBRICATE BRAKE & CLUTCH PEDALS**

Lubricate the brake* and clutch pedal springs, bushings and clevis pins. Lubricate the clutch control cable ends. Check clutch pedal free play.

25. CHECK DRUM BRAKES & PARKING BRAKE

(See Item 19 for disc brake check.) Check the drum brake linings for wear or cracks. Also inspect other brake parts at each wheel, such as the drums, and wheel cylinders. Check parking brake adjustment also when inspecting the drum brake linings.

Check brakes more often if conditions and driving habits result in frequent braking.

**26. CHECK & CLEAN COOLING SYSTEM •**

At 12 month or 15,000 mile (24,000 km) intervals, wash the radiator cap and filler neck with clean water, pressure test the system and radiator cap for proper pressure holding capacity, tighten the hose clamps and inspect all cooling and heater hoses. Replace hoses if cracked, swollen, or otherwise deteriorated.

Also every 12 months or 15,000 miles (24,000 km), clean the exterior of the radiator core and the air conditioning condenser. Every 24 months or 30,000 miles (48,000 km), drain, flush, and refill the cooling system with a new coolant solution, as described in the Owner's and Driver's Manual.

27. INSPECT FUEL CAP, LINES & TANK •

Inspect the fuel tank, cap and lines for damage which could cause leakage. Inspect the fuel cap for correct sealing ability and indications of physical damage. Replace any damaged or malfunctioning parts.

28. CHECK THROTTLE LINKAGE

Check for damaged or missing parts, interference, or binding. Fix any problems at once.

29. CHECK BUMPERS

Check the front and rear bumper systems for proper impact protection and clearance. Check also when a bumper looks out of position, or if it was struck hard—even if no damage can be seen.

**30. LUBRICATE FRONT & REAR PROPELLER SHAFT**

Lubricate the front universal joints and the sliding yoke every 7,500 miles (12,000 km).

Lubricate the rear universal joints every 7,500 miles (12,000 km).

31. CHECK STEERING GEAR

Check the steering gear lubricant every 12 months or 15,000 miles (24,000 km), whichever occurs first. Change the lubricant every 30,000 miles (48,000 km).

32. CHECK CARBURETOR CHOKE & HOSES

Check the choke mechanism for proper operation. Any binding condition which may have developed due to petroleum gum formation on the choke shaft or from damage should be corrected. Check the carburetor choke hoses for proper connection, cracking, abrasion or deterioration and correct or replace as necessary.

33. CHECK DRIVE BELTS •

Check the belts driving the fan, air pump, alternator, steering oil pump (if so equipped) and the air conditioning compressor. Look for cracks, fraying and wear. Adjust the tension or replace as needed.

34. CHECK DISTRIBUTOR ADVANCE MECHANISM •

Check the distributor advance mechanism and lubricate every 24 months or 30,000 miles (48,000 km), whichever occurs first.

35. CHECK AIR INJECTION REACTOR (A.I.R.) SYSTEM •

Check A.I.R. system hoses and fittings for loose connections and deterioration. Deteriorated hoses must be replaced.

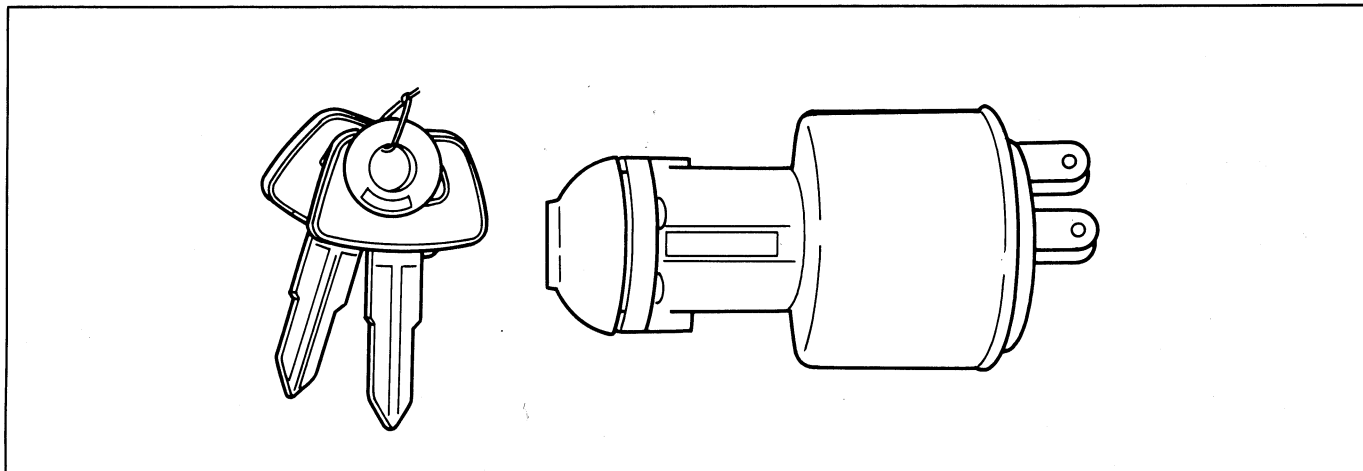
36. CHECK AIR CONDITIONING

Check the condition of the air conditioning system hoses and refrigerant charge at the sight glass. Replace the hoses and/or refrigerant if need is indicated.

RECOMMENDED FLUIDS & LUBRICANTS

USAGE	FLUID/LUBRICANT
Engine	SE or SF Engine oil (See oil chart in Owner's Manual for proper viscosity.)
Transmission	Engine oil (See oil chart in Owner's Manual for proper viscosity.)
Differential	GL-5 gear lubricant (See oil chart in Owner's Manual for proper viscosity.)
Power steering	DEXRON Automatic transmission fluid
Brake system and master cylinder	DOT-3 hydraulic brake fluid.
Clutch system	Engine oil.
a. Pivot points	Chassis grease.
b. Clutch fork joint	
Hood latch assembly	Engine oil.
a. Pivots and spring anchor	Chassis grease.
b. Release pawl	
Hood and door hinges	Engine oil.
Chassis lubrication	Chassis grease.
Parking brake cables	Chassis grease.
Front wheel bearings	Wheel bearing grease.
Front propeller shaft	Chassis grease
a. Sliding yoke	MoS ₂ contained grease or Multipurpose type grease NLGI No.2
b. Universal joint	
Rear propeller shaft	MoS ₂ contained grease or Multipurpose type grease NLGI No.2
a. Universal joint	Engine oil.
Body door hinge pins and linkage, fuel door hinge, rear compartment lid hinges, heater water valve.	
Windshield washer solvent	Washer fluid.
Engine coolant	Mixture of water and a high quality Ethylene Glycol base type antifreeze.

LOCK CYLINDER KEY AND INFORMATION



Ignition and door locks on the KB82 are operated with the same key.

The key code number is stamped on the attached key ring and also on the ignition lock cylinder housing. The code number will be somewhere between C6001 and C7042.

The door lock cylinders are not marked with the key number.

When a lock cylinder is replaced, a new coded key will be provided.

There are one thousand key combinations between the code identification numbers C6001 and C7042.

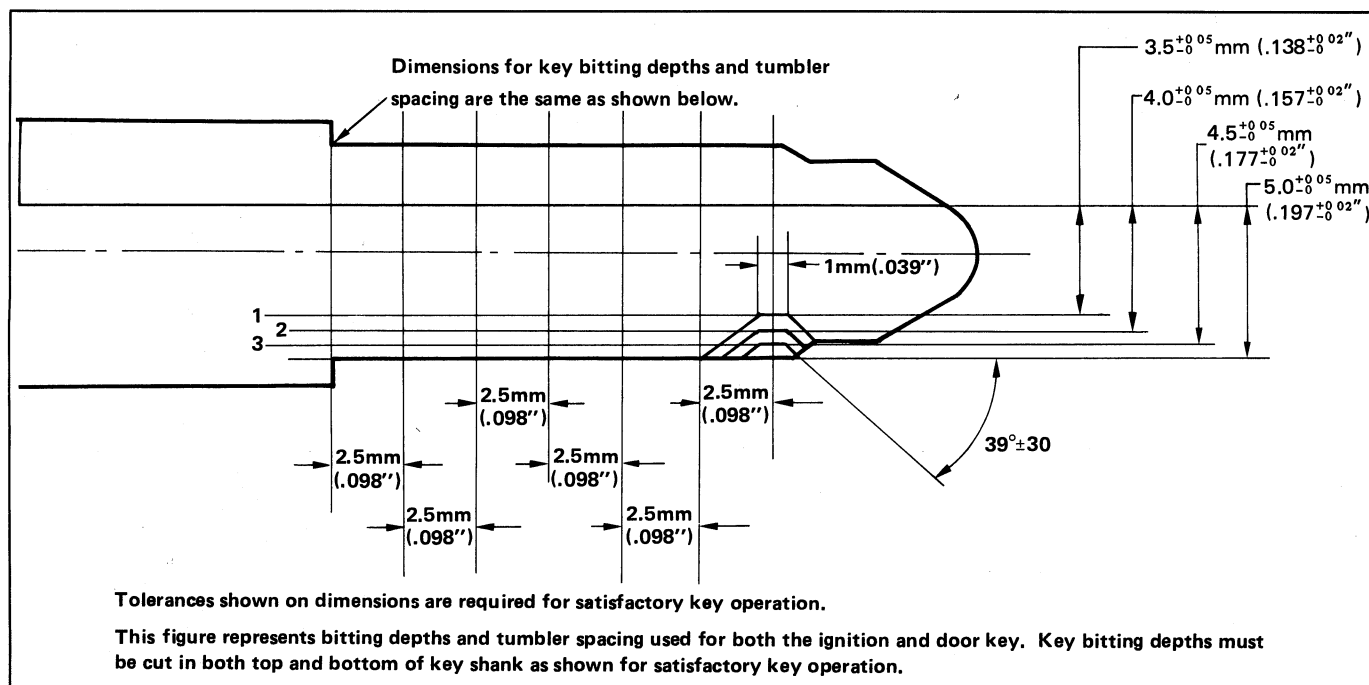
Each key has four biting depths. These biting depths are identical on each side of the key, permitting insertion of the key in either direction.

The lock cylinder tumbler bits are preset at the factory and can not be reset in the field.

All vehicles come with two keys, the second one to be used as a spare.

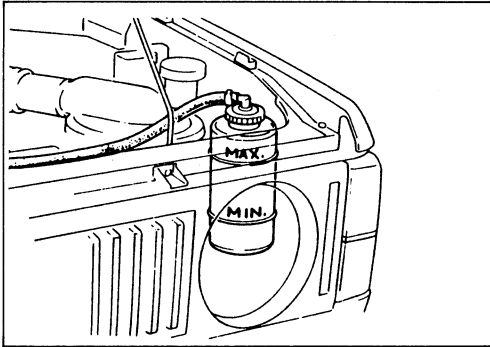
In the event both keys are lost, a new set of lock cylinders and keys may be required.

If the key number is known, replacement keys can be made.

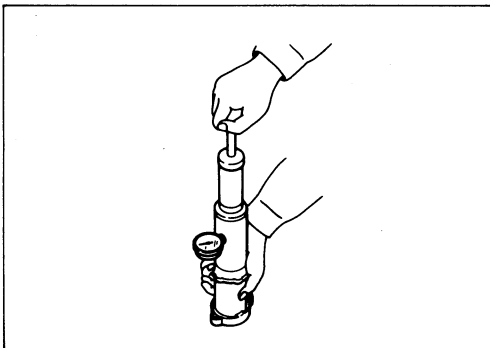


SERVICING

COOLING SYSTEM



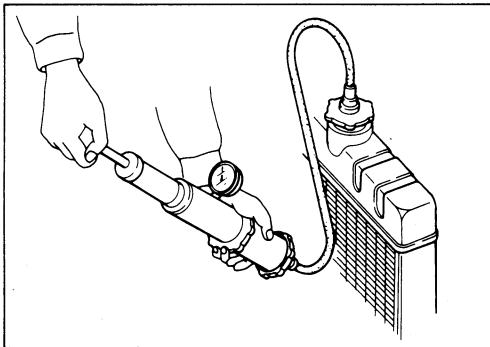
The cooling water level should be between the maximum and the minimum level marks on the radiator reserve tank.



The radiator cap is designed to hold 1.05 kg/cm² (15 psi) of pressure in the cooling system. The cap may be checked using a radiator cap tester. Replacement of the cap is necessary should it fail to hold pressure during the test procedure.

kg/cm²(psi)

Pressure valve	Negative pressure valve
0.9 — 1.2 (13 — 17)	0.04 — 0.05 (0.6 — 0.7)



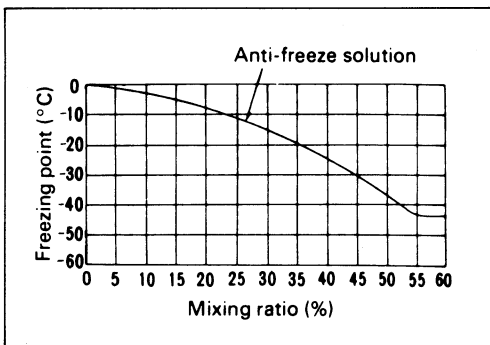
Install the radiator filler cap tester on the radiator and check the cooling system for leakage by applying test pressure. Test pressure should not exceed the specified pressure.

kg/cm²(psi)

Testing pressure	2 (28)
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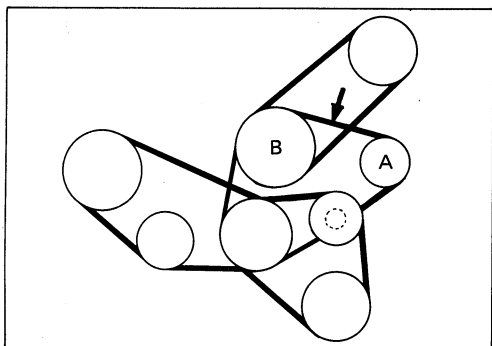


Flush the cooling system any time the fluid is replaced. Be sure to remove all contaminants.



An adequate amount of anti-freeze should be added to the cooling system depending on the lowest temperature anticipated. Total cooling system capacity is 6.0 liters. (1.585 gal.s)

FAN BELT

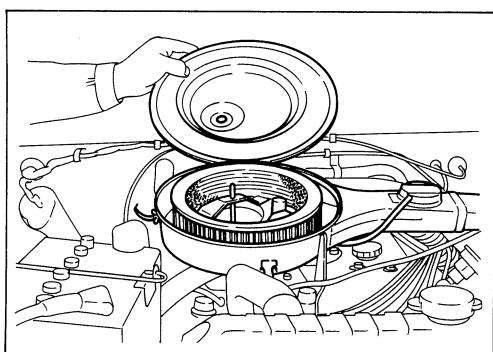
**Adjustment**

Adjust the belt tension by moving the generator pulley and the fan pulleys (A, B).

Specified belt deflection

		mm(in.)
Fan belt	(mm)	10 (0.4)

AIR CLEANER

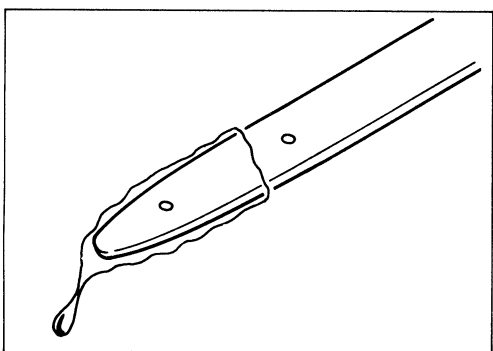
**Visual check**

Servicing is unnecessary until replacement interval is reached.



The air cleaner element should be replaced at specified intervals or more often when the element is subjected to dusty or severe driving conditions. The element should be replaced immediately if it is damaged or fouled.

ENGINE OIL



Check the oil level in the engine oil pan with the oil dipstick, and replenish as necessary.

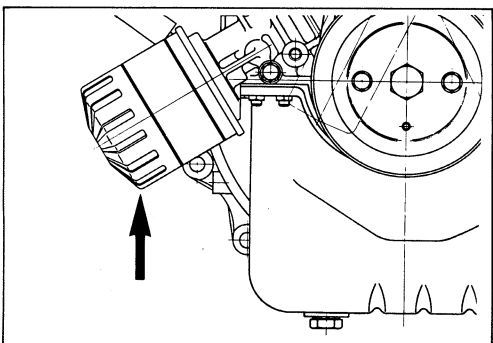
		Liters (US quart)
Oil capacity	with filter	3.6 (3.8)
	without filter	3.2 (3.4)



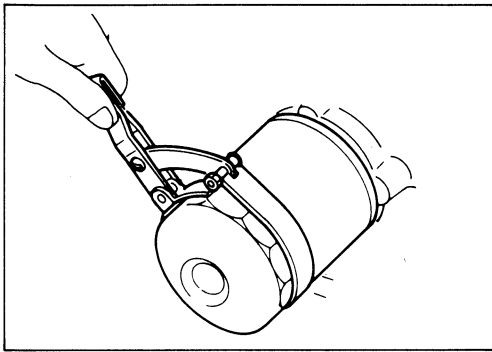
Check the engine oil for contamination. If engine oil has deteriorated through contact with or gasoline, establish cause and perform the necessary service.

The replace the engine oil at specified intervals.

OIL FILTER (CARTRIDGE)

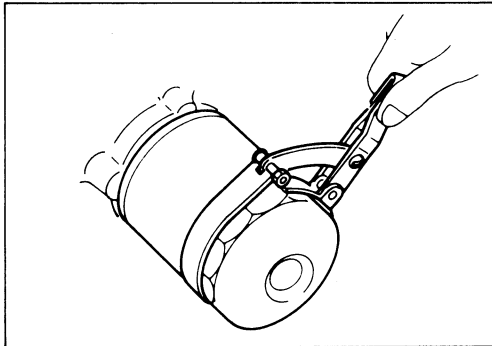
**Removal steps**

1. Drain the engine oil by removing the drain plug on the oil pan.



2. Remove the oil filter using a filter wrench.

Filter wrench : J-2270



Installation steps

1. Apply engine oil to the circumference of the oil filter O-ring.
2. Turn in oil filter element until the O-ring is seated against the filter body. Further turn in the filter 1 turn using a filter wrench.



The filter wrench should be fitted against the portion near the bottom of the filter.



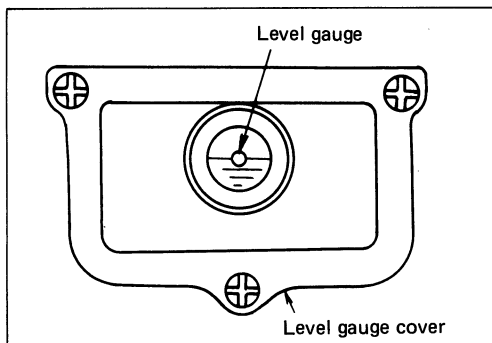
Torque	mm(in.)	0.5 (36.17)
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Remove the oil filter cap and pour in engine oil.



Start the engine and check for oil leakage from around the sealing face.

CARBURETOR



Check carburetor float level

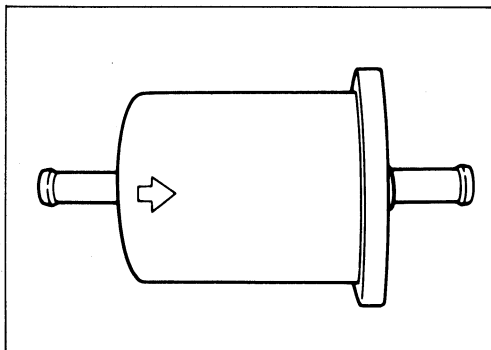
The fuel level is normal if it is within the marks on the window glass of the float chamber when the engine is stationary. If the fuel level is outside the lines, make the necessary adjustment by bending the float seat. The needle valve should have an effective stroke of about 1.5 mm (0.059 in.)

To check the stroke, hold the carburetor with the bottom side up and fully raise the float. The needle valve stroke is normal when a clearance of 1.5 mm (0.059 in.) is provided between the valve stem (resting on bottom position) and the float seat. When necessary, the needle valve stroke can be adjusted by bending the float stopper.



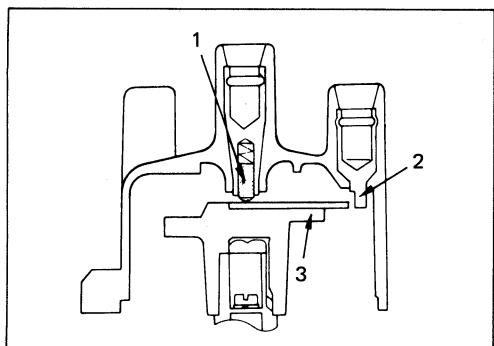
NOTICE: Be careful not to bend the needle valve rod when installing the float and baffle plate.

FUEL FILTER



Check the fuel filter connections for leakage and the fuel hoses for cracks and fatigue, and replace if necessary.

DISTRIBUTOR



1. Distributor cap

Remove the distributor cap and check the following points. Replace the parts as necessary.

- 1) Check center electrode (1) and side electrode (2) for corrosion and burning.
- 2) Check rotor (3) for wear and burning.
- 3) Check the center carbon for wear and cracks.



2. Inspection of ignition unit

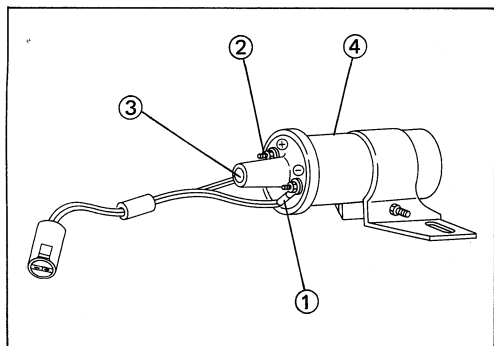
Disconnect the high-tension cable between the ignition coil and the distributor at the distributor and hold the end of cable about 6 mm away from the ground.

Engage the starter and check to see if a spark jumps across the gap.

If there is no spark, check the following points. If no trouble is found through the checks, the distributor is at fault and should be replaced.

- 1 Check to see if the ignition coil is energized when the key switch is ON.
- 2 Make a continuity test on the ignition coil.

IGNITION COIL

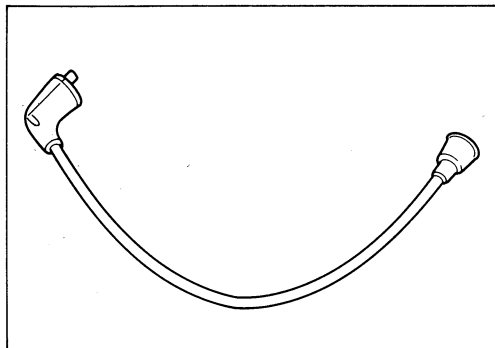


Ignition coil resistance

1. Disconnect the wiring and the ignition coil and high tension cable at the connector.
2. Set a circuit tester to x1 Ω range and x1 K Ω , and measure the resistance.

		Standard
Primary coil resistance (①-③)	(Ω)	1.130 - 1.529
Secondary coil resistance (①-②)	(K Ω)	10.20 - 13.80
Insulation resistance (②-④)	(M Ω)	More than 10

HIGH-TENSION CABLE



1. Check the high tension cables for broken insulation and the terminals for corrosion or damage, and replace with new ones if necessary.



Measure the resistance in the cables, and replace the cables with new ones if the measurements deviate from the specified value.

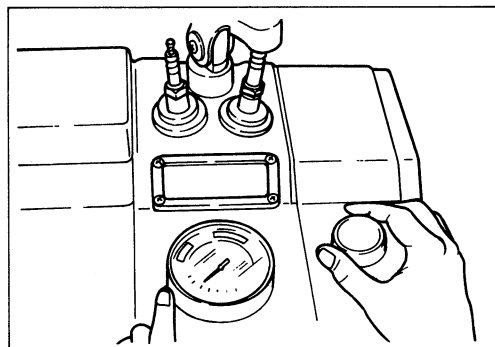
Resistance	(K Ω /m)	9.6 — 22.6
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2. Replace the terminals if they fit loosely.

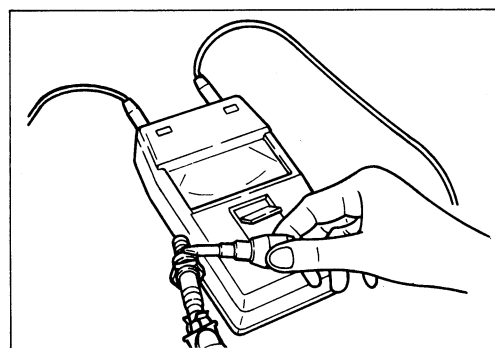


Note: The cables contain a synthetic conductor and should not be stretched hard or kinked sharply. Sticking a needle or pointed end of a probe into the cable in the course of timing check will cause an increase in the resistance at that point, causing burning of the cable.

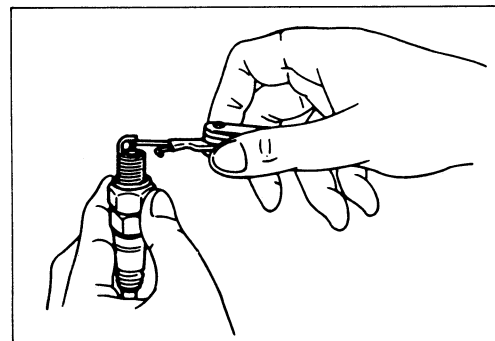
SPARK PLUG



1. Check the condition of the electrodes and insulators for cracks and replace if faulty.
2. Check the electrodes for wear and replace if necessary.
3. Make a spark test using a spark tester and replace all parts found to be defective.
4. Check the gasket for damage and replace if necessary.



5. Check the insulation resistance using an ohm-meter. Replace the part if found to be defective.

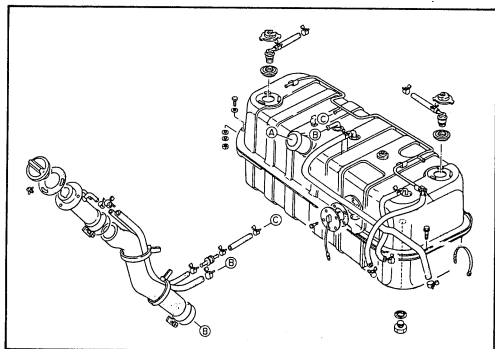


6. Adjustment of the spark gap

	mm(in.)
Spark gap	1.0 — 1.1 (0.039 — 0.043)

If fouling of the spark plugs is excessive, check the fuel and the electrical systems for possible causes of trouble. If the fuel and the electrical systems are normal, install spark plugs of a higher heat range. If burning of the insulators and electrodes is considerable, install spark plugs of a lower heat range.

FUEL TANK



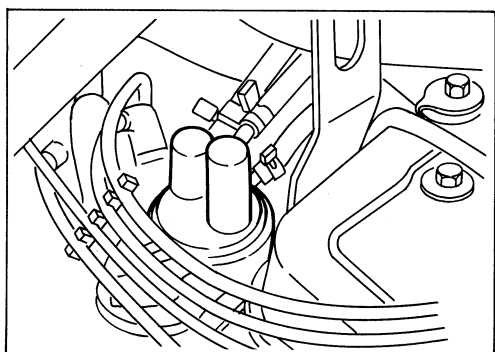
Check the fuel tank for deformation, rusting, or fuel leakage and correct or replace as necessary. To check for leakage, proceed as follows:

Submerge the fuel tank in water with all the openings plugged. Apply compressed air 0.1 kg/cm² (1.4 psi) into the tank from the evaporator pipe and look for air bubbles.



NOTICE: A cracked or leaking tank should be replaced, not welded.

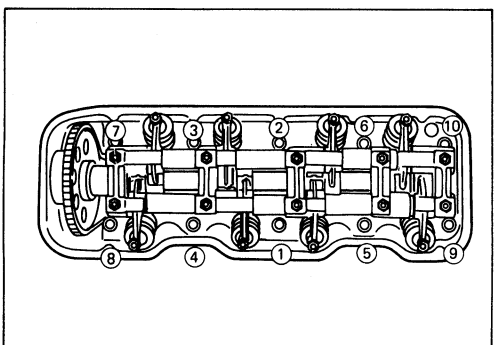
FUEL PUMP



Inspection

1. Check the entire portion of fuel pump for cracking or damage and replace the entire fuel pump assembly with a new one if any abnormal condition is present.
2. Check the fuel pump gasket for deterioration in material or cracking and replace with a new one if it is found to be leaking.

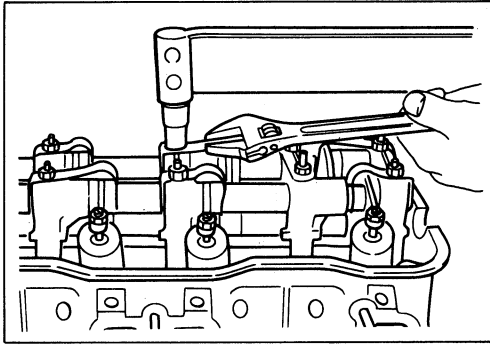
CYLINDER HEAD BOLT



Tighten the cylinder head bolts in sequence as shown in the figure.

kg-m(ft.lbs.)		
Torque	First step	6.0 (43.4)
	Second step	10 — 11 (72 — 79)

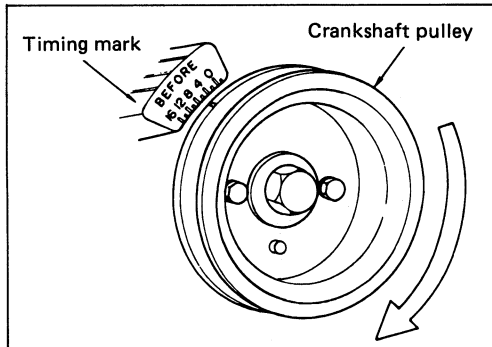
VALVE CLEARANCE



Check the rocker arm bracket bolts for looseness and retighten as necessary before adjusting the valve clearances.

kg-m(ft.lbs.)

Torque	1.95 — 2.45 (14.1 — 17.8)
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Turn the crankshaft one full turn in the normal direction and align the notched line in the crankshaft pulley with the "O" mark on the timing gear case cover, so that piston in either the No. 1 or No. 4 cylinder is brought to top dead center on the compression stroke.

Valve \ Cylinder	Cylinder			
	1	2	3	4
Intake	○	○	●	●
Exhaust	○	●	○	●

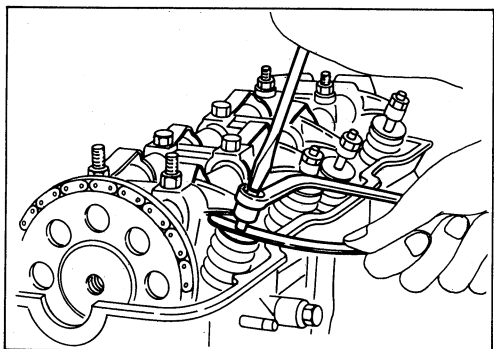
Note: ○ When piston in No. 1 cylinder is at TDC on compression stroke,
● When piston in No. 4 cylinder is at TDC on compression stroke.



Measurement should be taken at the clearance between the rocker arm and the valve stem. Turn the crankshaft one full turn and adjust the clearance of the remaining valves.

mm(in.)

Intake valves	0.15 (0.006) at cold
Exhaust valves	0.25 (0.010) at cold



Measurement should be taken at the clearance between rocker arm and valve stem.

Turn crankshaft one full turn and adjust clearance of remaining valves. Standard valve clearances, at low temperature are:

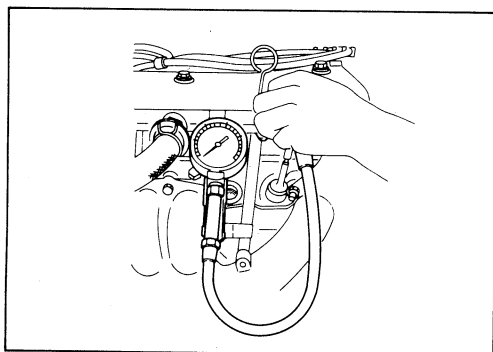
	mm(in.)
Intake valves	0.15 (0.006) at cold
Exhaust valves	0.25 (0.010) at cold

COMPRESSION TEST

Preparation

1. Set the engine tachometer after warming up the engine thoroughly.
2. Stop the engine. Disconnect the fuel hose between the pressure regulator and the fuel distributor pipe to reduce the fuel pressure. Remove the main relay connector.
3. Remove all spark plugs.
4. Engage the starter and check that the cranking speed is approximately 300 rpm.

* Replace the battery if the cranking speed does not reach 300 rpm.



Measurement

1. With the throttle valve opened fully, keep the starter engaged until the compression gauge needle reaches the maximum level and then take the reading of the gauge.
2. Repeat the test on each cylinder.

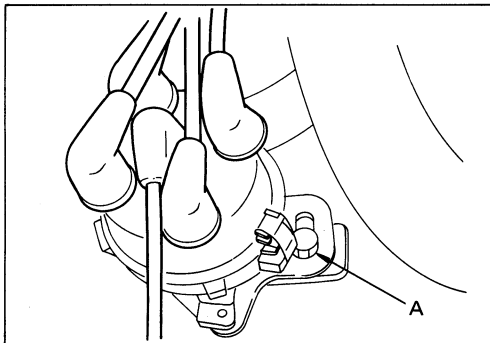
	kg/cm ² (psi)	
	Standard value	Limit
Compression pressure (At cranking speed of approximately 300 rpm)	Higher than 12.0 (170.6)	8.4 (119.5)
Variance in compression pressure in cylinders	0.6 (8.53)	

* If the compression pressures obtained were lower than the limit, engine overhaul is necessary.

IGNITION TIMING

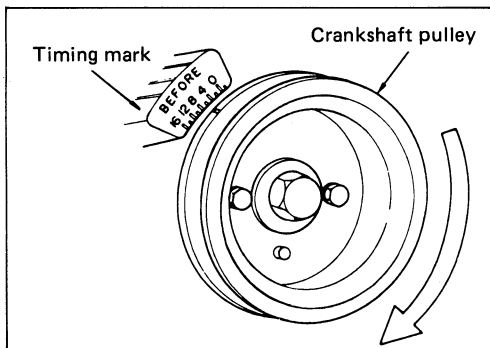
Preparation

1. After the engine has thoroughly warmed up, check that the idling speed is correct.
2. Set the engine tachometer and timing light.
3. Shut off the air conditioning system.



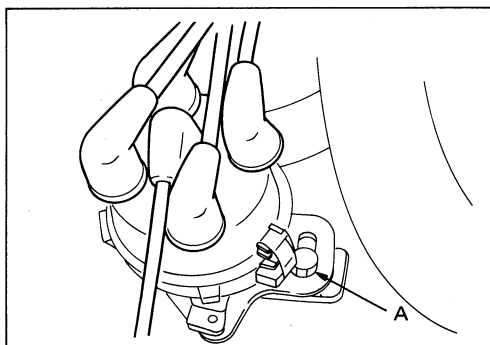
Adjustment

1. Loosen the nut (A) fixing the distributor and start the engine.



2. While aligning the notched line on the crankshaft pulley with the timing light, adjust the ignition timing by turning the distributor clockwise or counter-clockwise as required.
3. Check that the ignition timing is within the specified range.

Specified value (BTDC°/rpm)	6/800 (Federal)
	6/900 (California)



4. After adjustment, tighten nut (A) holding the distributor.

IDLE ADJUSTMENT

1. Set the parking brake and block the drive wheels.
2. Place the transmission in neutral.
3. The following conditions are essential for idle speed adjustment:
The engine should be running at a normal temperature.
The choke should be open.
The air conditioning system should be off.
The air cleaner should be installed on the engine.
The distributor line, the canister plug line, and the EGR vacuum line should all be disconnected and plugged.
The idle compensator vacuum line should be closed. This can be done by bending the attached rubber hose.



4. Adjust throttle adjust screw to 900 ± 50 rpm (California) or 800 ± 50 rpm (Federal).
5. Additional procedures if the vehicle has an conditioner.

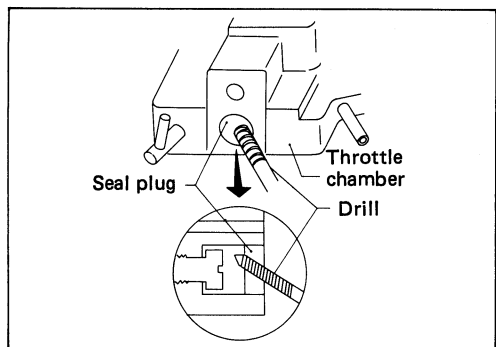
- Turn A.C. to Max. Cold and High blower.
- Open the throttle to approx. $1/3$ and allow the throttle to close. (This allows the speed up solenoid to reach full travel.)
- Adjust the speed up controller adjusting screw to set idle at 900 ± 50 rpm.



IDLE MIXTURE ADJUSTMENT

Federal

1. Set the parking brake and block the drive wheels.
2. Place the transmission in neutral.
3. Remove the carburetor assembly.
4. Drill a hole in seal plug and remove plug with proper tool. After drilling, be sure to remove shavings with compressed air.



5. Re-install the carburetor assembly.
6. Make idle speed adjustment with engine at normal operating temperature, choke open, air conditioner off if installed, and distributor vacuum line, canister purge line and EGR vacuum line disconnected and plugged, and idle compensator vacuum line closed by bending rubber hose.
7. Adjust throttle adjust screw to 800 ± 50 rpm.
8. Turn the idle mixture adjust screw all the way in and then back out 3 turns.



9. Adjust the throttle adjust screw to 800 rpm.
10. Adjust the setting of the idle mixture adjust screw to achieve the maximum speed.



11. Reset throttle adjust screw to 850 rpm.
12. Turn idle mixture adjust screw clockwise (lean) until the engine speed is down to 800 ± 50 rpm.
13. Replace the idle mixture screw plug.

- Additional procedures if the vehicle has an air-conditioner are listed under "IDLE ADJUSTMENT".

California



1. Follow the steps 1 to 5 under "IDLE MIXTURE ADJUSTMENT" (Federal model).
2. The following conditions are essential for idle speed adjustment:

The engine should be running at a normal temperature.

The choke should be open.

The air conditioning system should be off.

The air cleaner should be installed on the engine.

The distributor line, the canister plug line, and the EGR vacuum line should all be disconnected and plugged.

The idle compensator vacuum line should be closed. This can be done by bending the attached rubber hose.

3. Turn the idle mixture adjust screw all the way in and back out 1-1/2 turns.



4. Adjust the throttle adjust screw to 900 ± 50 rpm.
5. After confirming dwell or duty to vary, Adjust setting of idle mixture adjust screw to obtain an average dwell on duty as specified.

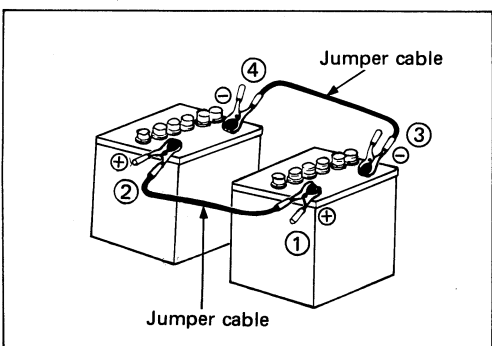
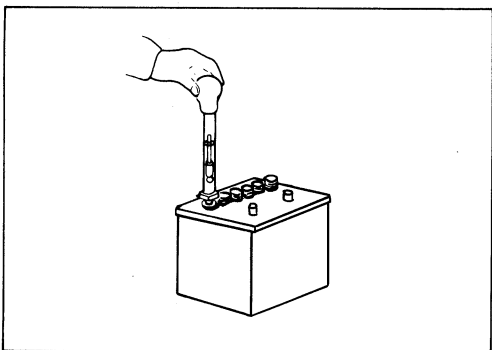
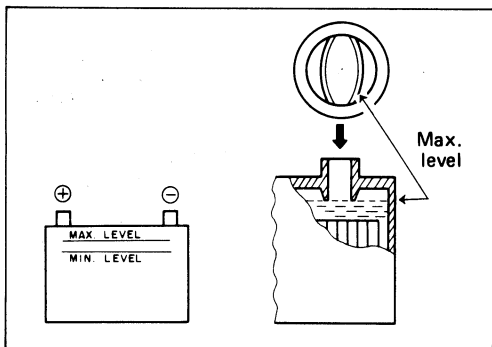
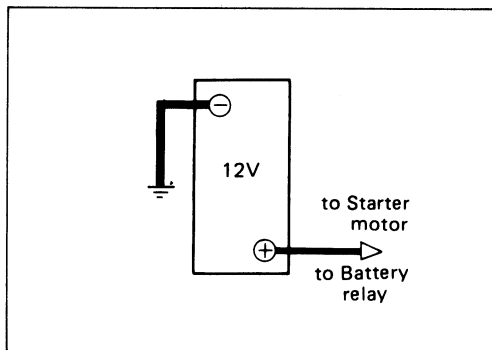
	Dwell meter (4-cyl. scale)	Duty meter
Average	36°	40%

The dwell or duty reading specified is the average of the most constant vibration.



6. Reset throttle adjust screw to 900 ± 50 rpm.
7. Replace the idle mixture screw plug.

ELECTRICAL



Electrical circuit

Voltage	(Volt)	12
Ground		Negative

Inspection of battery

1. Inspect the terminals for looseness and corrosion
Keep the terminals connected securely. Remove any traces of corrosion and keep the terminals clean at all times.
2. Inspect the battery electrolyte levels
If the battery electrolyte levels are found to be low, replenish with distilled water to bring the levels up to the maximum.

Measurement of the specific gravity of the battery electrolyte

The specific gravity of the battery electrolyte measured at a temperature of 20°C should be regarded as standard since the specific gravity of the battery electrolyte varies with temperature.

Therefore, temperature-correction should be made by using the following formula when measurement is taken.

$$S_{20} = S_t + 0.0007 (t - 20)$$

Where, S_{20} : Specific gravity after temperature correction at 20°C.

S_t : Specific gravity measured at $t^\circ\text{C}$

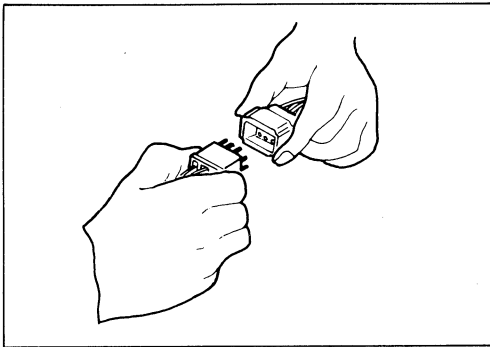
t : Temperature of battery electrolyte measured at $t^\circ\text{C}$.

If the measured specific gravity is lower than 1.23 (at 20°C).

Connection of jumper cable

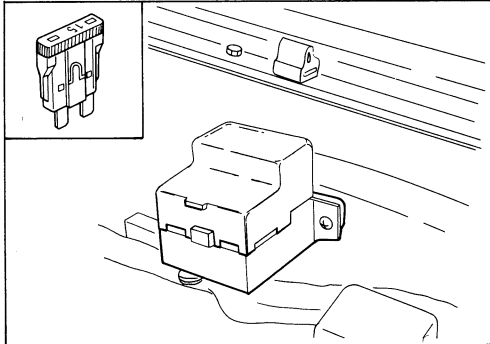
Jumper cables with sufficient load capacity should be connected, positive (+) to positive (+) and negative (-) to negative (-) as illustrated.

Connect the cables in numerical order and disconnect them in reverse order.



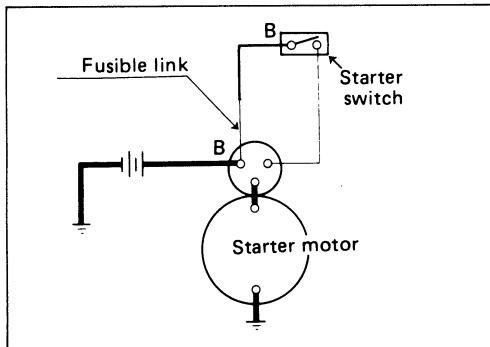
Removal of the harness couplers

The connector plugs should always be disconnected using both hands. Pulling the connector apart with one hand may cause separation of the terminal from the wire.



Replacement of fuse

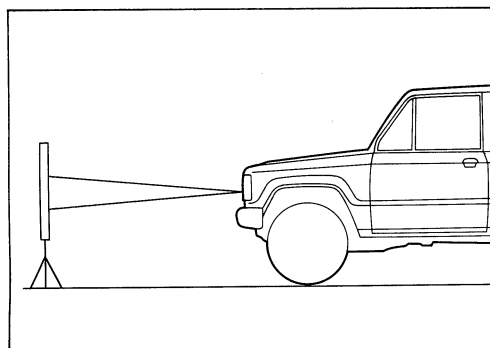
It is important to use a fuse of the specified amperage. The use of fuses higher than the specified amperage can cause burning of the wiring harnesses.



Inspection of the fusible link

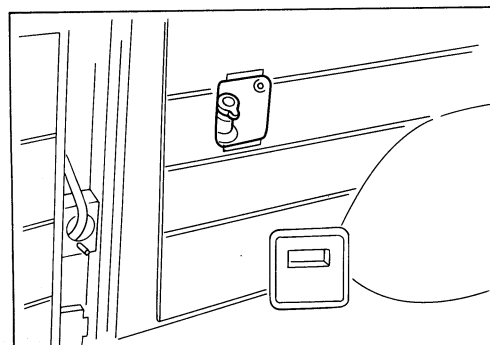
The fusible link is inserted between the starter motor B terminal and the starter switch B terminal.

It melts when excess current flows through the circuit to protect the main power circuit against overloading. Test on the circuit by checking the continuity across the terminals using a circuit tester.



Aiming of headlights

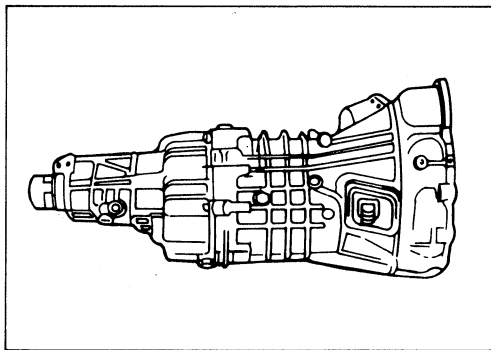
1. A headlight should be aimed properly after removal or replacement of the sealed beam.
2. A headlight tester or aiming is necessary.



Rear wiper

Washer tank

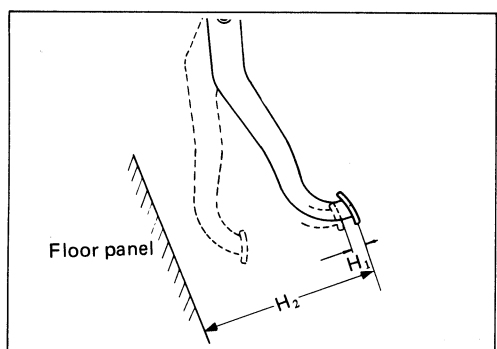
TRANSMISSION



Oil replacement

Transmission with transfer case Approx. 2.5 (L)

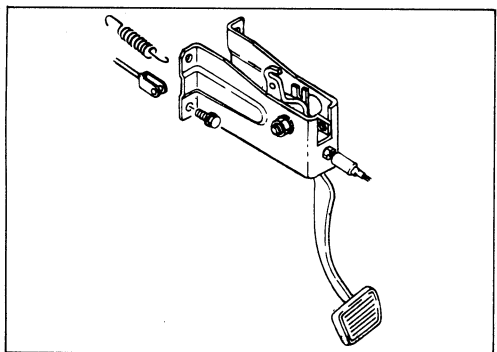
CLUTCH



Pedal free play and height

mm(in.)

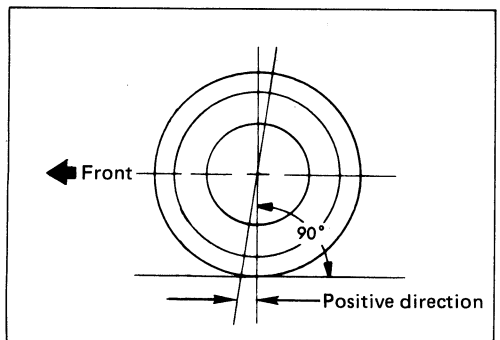
Type	Pedal free play (H ₁)	Height (H ₂)
Mechanical	20	226 — 236 (8.9 — 9.3)



Pedal height adjustment

Adjust pedal height with pedal stopper bolt (California) or the clutch switch (Federal).

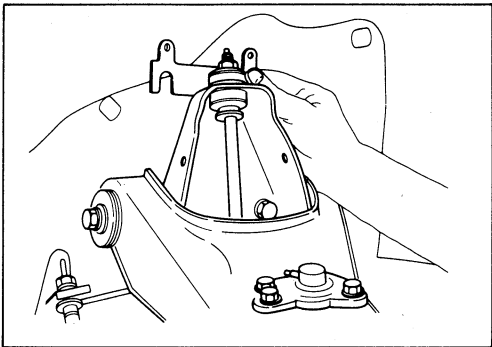
FRONT SUSPENSION



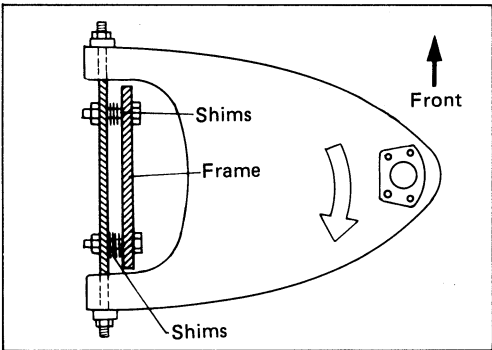
Adjustment of front wheel alignment

1. Caster

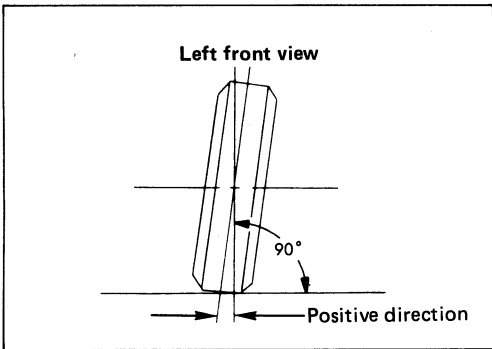
Caster angle	30'
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The caster angle can be adjusted with the caster shims installed in position between the chassis frame and the fulcrum pins.

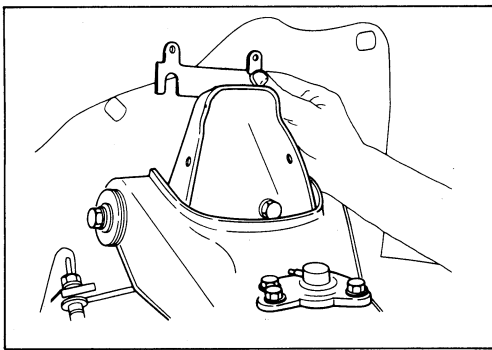


Position of shims		Caster angle
Front side	Rear side	
When added	When removed	Decreases
When removed	When added	Increases

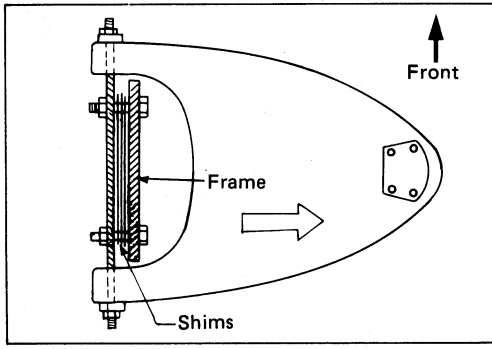


2. Camber

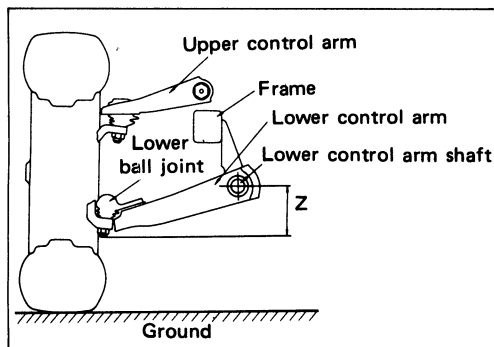
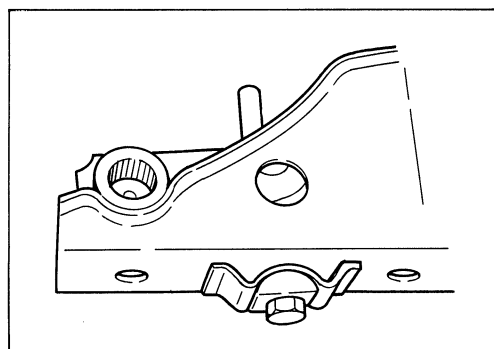
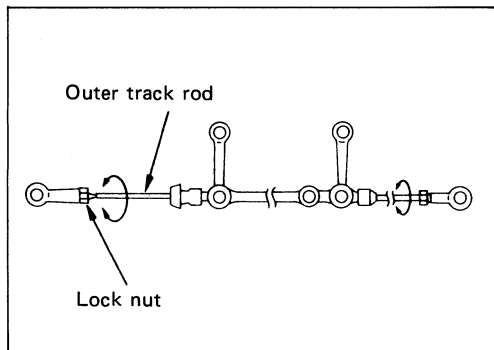
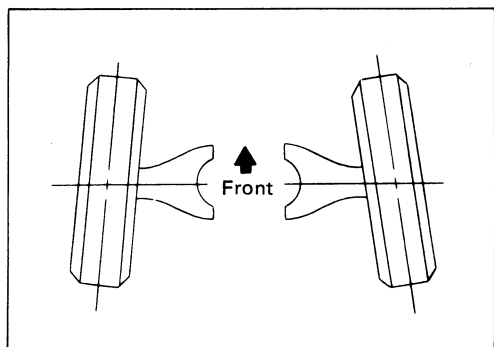
Camber angle	35'
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The camber angle can be adjusted with the camber shims installed in position between the chassis frame and the fulcrum pins.



Position of shims	Camber angle
When added	Decreases
When removed	Increases



3. Toe-in

Limit	mm(in.)	$0 \pm 2(0.08)$
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To adjust the toe-in angle, loosen the lock nut on the outer track rod and turn the outer track rod.

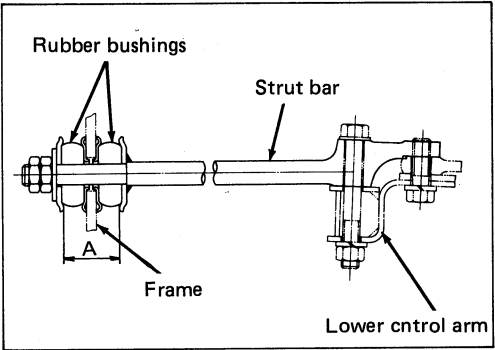
Adjustment of vehicle height

Adjust the height of the vehicle by means of the adjusting bolt on the height control arms.

1. Check and adjust the tire inflation pressures.
Front wheels: (when not loaded) - 1.8 kg/cm²
Rear Wheels: (when not loaded) - 2.6 kg/cm²
2. Park the vehicle on level ground and move the front of the vehicle up and down several times to settle the suspension.
3. Loosen the nuts on the front end of the strut bar.
4. Make necessary adjustments with the adjusting bolts on the height control arms.

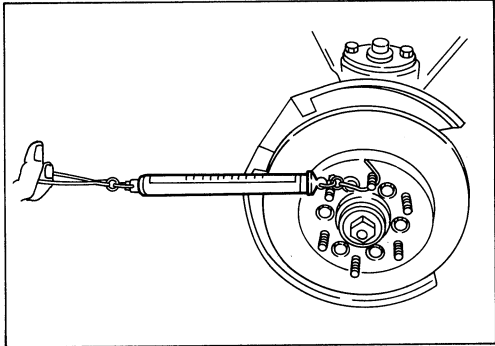
Trim height

Z	mm(in.)	131 (5.16)
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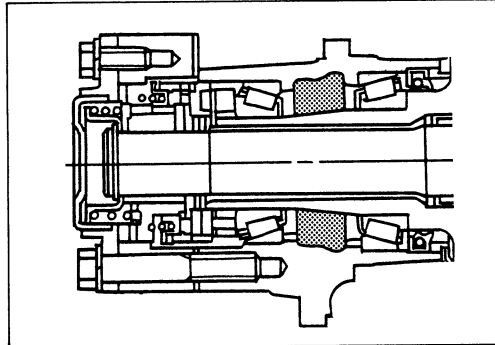
5. Securely tighten the strut bar nuts

A	mm(in.)	36 — 38 (1.42 — 1.50)
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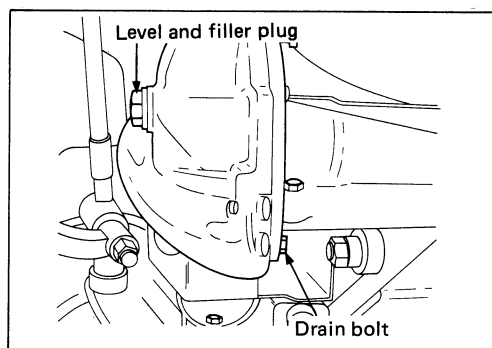
Hub bearing preload at the wheel pin

Preload	kg(lbs.)	1.5 (3.31)
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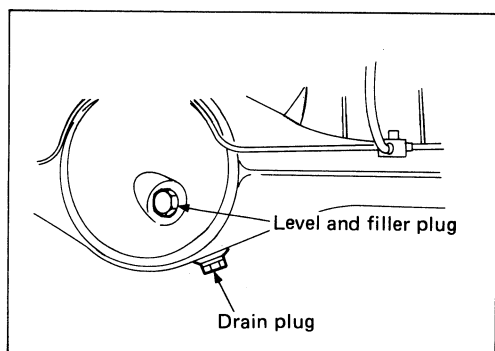


Amount of hub grease required (reference)

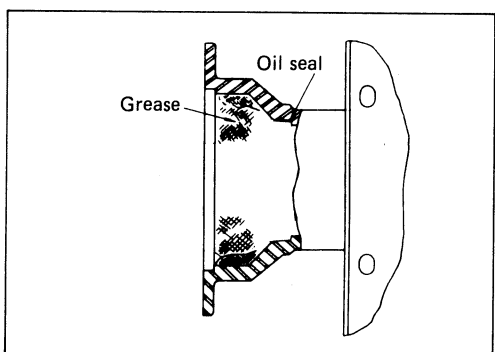
	g(oz)
Inner bearings	8 (0.28)
Outer bearings	4 (0.14)
Hubs	60 (2.12)

FRONT AXLE**Drive axle oil replacement**

Oil capacity	liter(us gal.)	1.0 (0.26)
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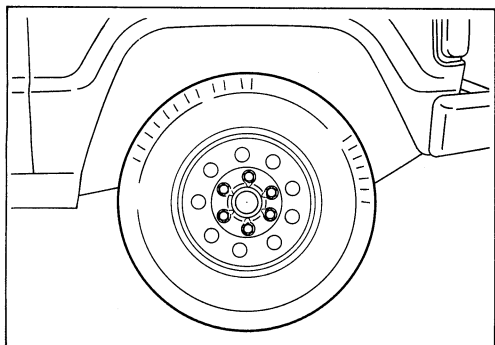
REAR AXLE**Rear axle oil replacement**

Oil capacity	liters(us gal.)	1.5 (0.80)
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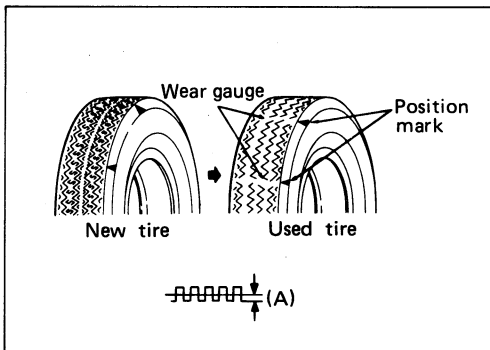
**Repacking of bearing grease**

Required (reference)

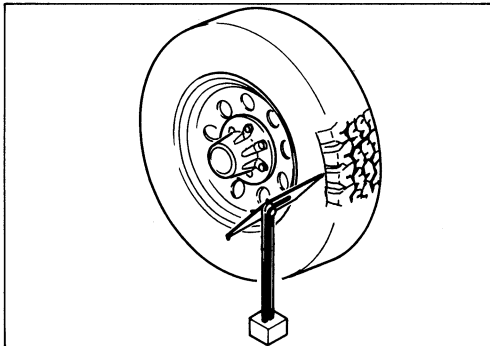
Bearing holder	g(oz)	80 (2.8)
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TIRE & WHEELS**Tire inflation pressure**

Tire size	Inflation pressure
P225/75R-15 kg/cm ² (psi)	1.8 (26)

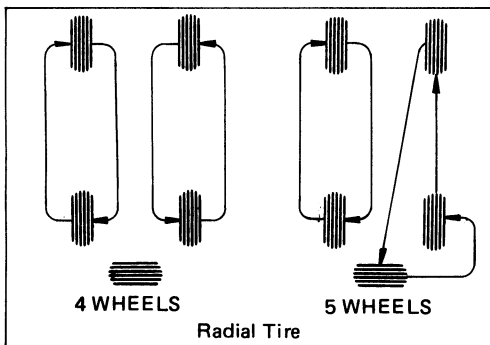
**Tire tread wear**

Limit (A)	mm(in.)	1.6 (0.06)
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**Measurement of wheel lateral run-out**

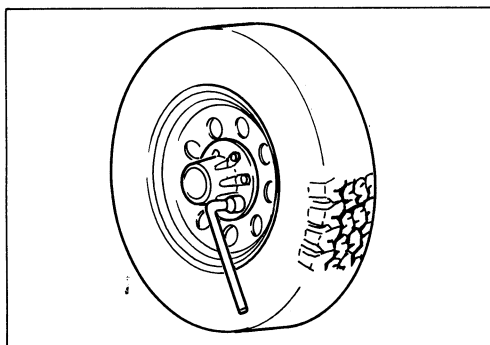
Jack up the wheels clear of the ground and check for lateral run-out. Check the wheel nuts for looseness and hub bearings for play before checking the wheel run-out.

Limit	mm(in.)	3.0 (0.12)
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**Tire rotation**

Tire position on the vehicle determines the way in which the tire tread wears. Rear tires tend to wear gradually and in an even fashion as they are alternately subject to both traction and braking force. Tires on the front of the vehicle, on the other hand, are subject to braking and turning forces and tend to wear more rapidly and erratically.

Rotating your tires evens out tire wear and prolongs tire life. It should be done periodically in the manner shown in the figure.

**Tighten wheel nuts in numerical order.**

Torque	kg-m(ft.lbs.)	8 — 11 (58 — 80)
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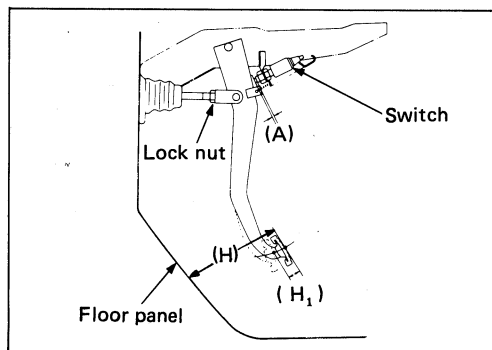
BRAKE

Brake pedal adjustment

The push-rod serves as the brake pedal stopper when the pedal is fully released. Brake pedal height adjustment should be performed as follows.

1. Brake pedal — Height

Measure the brake pedal height after making sure the pedal has been fully returned by the pedal return spring.



	mm(in.)
Pedal height (H)	198 — 208 (7.8 — 8.2)
Free play (H ₁)	7 — 10 (0.28 — 0.39)

If the measured value deviates from the above range, adjust the brake pedal as follows.

- Disconnect the stop lamp switch.
- Loosen the lock nut on the push rod.
- Adjust the brake pedal to the specified height, rotating the push rod in the appropriate direction.

Nut torque	kg-m(ft.lbs.)	1.8 — 2.2 (13 — 16)
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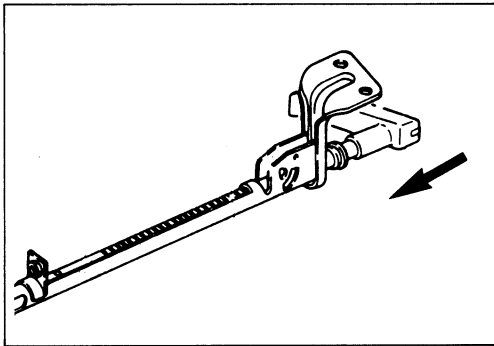
- Install the stop lamp switch.

Clearance

	mm(in.)
Between the switch housing and brake pedal (A)	0.5 — 1.0 (0.02 — 0.04)

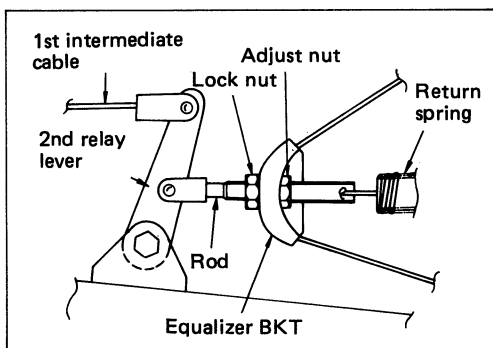
ADJUSTMENT PROCEDURE OF SERVICE BRAKE

All brakes are self-adjusting. The front brakes self-adjust when the vehicle is moved slowly back and forth while applying the service brakes. The rear brakes self-adjust when the parking brake is set and released.

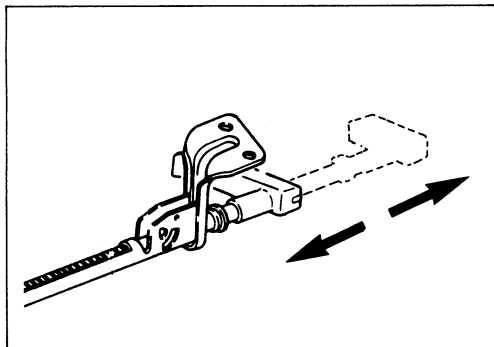


Take the following steps after overhauling the rear brake assembly.

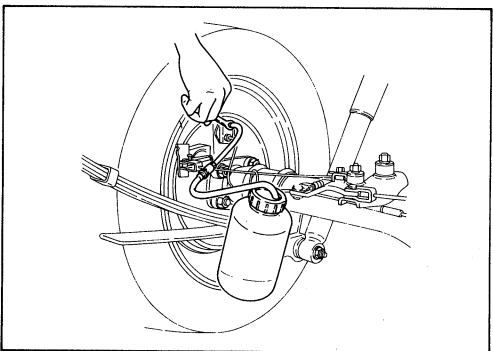
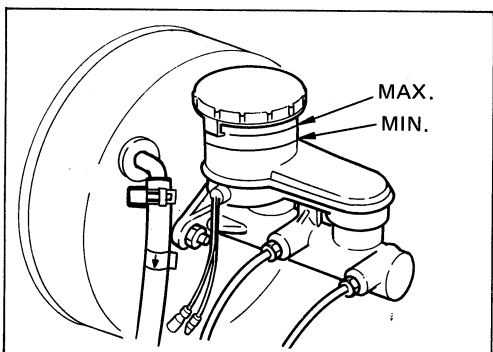
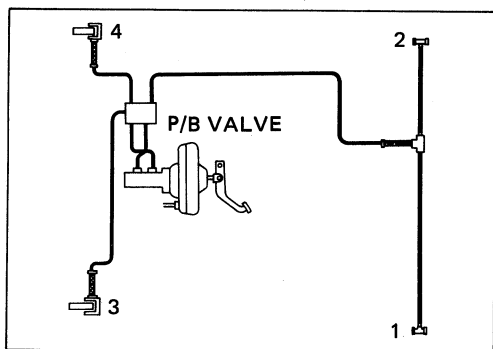
1. Move the parking brake handle to its fully released position.



2. Firmly grasp the second relay lever rod. Rotate the adjust nut until all slack disappears from the cable. Set the adjust nut.



3. Applying about thirty kilograms of force, pull the parking brake handle to its fully set position three or four times.
 4. If the parking brake is properly adjusted, the traveling range between the fully disengaged position and the fully engaged position will be between twelve and fourteen notches.
- If the traveling range is not within these limits, again reset the adjust nut.



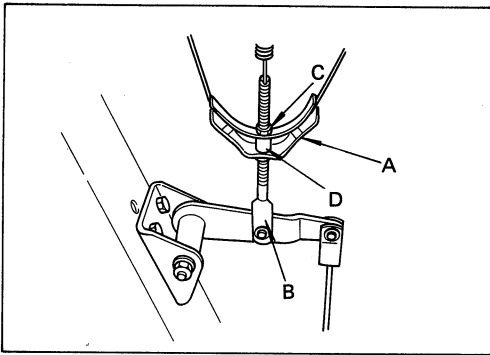
Bleeding

- Perform bleeding operation with ENGINE RUNNING, to prevent damage to push rod seal. Make sure exhaust is suitably ventilated.
- Bleed the hydraulic system with the fluid reservoir filled to the specified level.
- Bleed the system starting with the left hand (right hand) side rear wheel cylinder farthest to the master cylinder.

1. Fill the brake fluid reservoir with brake fluid.
Handle the brake fluid with reasonable care to avoid spillage as it is damaging to paint.

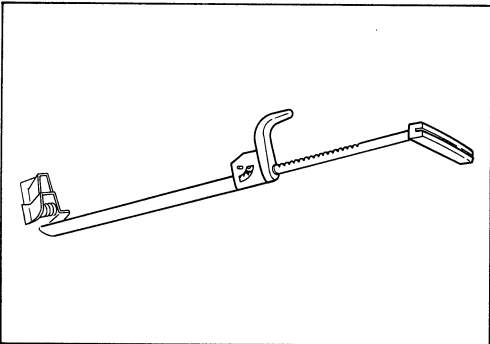
NOTE: Take care to prevent foreign matter from entry, when replenishing or replacing brake fluid.

2. Connect a vinyl pipe to the bleeder screw on the wheel cylinder and the other end of the pipe in a transparent container.
3. Pump the brake pedal several times and hold it depressed. Loosen the bleeder screw to release brake fluid together with air bubbles. Tighten the bleeder screw before pressure is released completely.
4. Repeat the step in paragraph 3 above until the air bubbles disappear completely. Securely tighten the bleeder screw when the air bubbles disappear completely.
5. Repeat the step in paragraph 4 above on the remaining wheel cylinders. Bleed the system starting with rear side farthest from the brake fluid reservoir.
6. Fill the brake fluid reservoir to the specified level.
Pour brake fluid carefully so as not to produce air bubbles.



Parking brake adjustment

1. Fully release the parking brake lever.
2. Make an adjustment with the nuts (C) and (D) connecting equalizer of rear cable (A) with the front cable (B) to remove play in parking brake cable.



3. After adjustment operation, check that lever travel is within 11 — 12 notches when tested by pulling the parking brake lever with a force of approximately 30 kg, then caulk the nut.

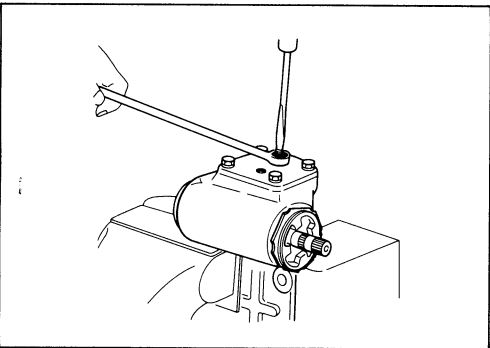
Stroke (notches)	12 — 14
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Note: Avoid pulling the parking brake lever while making an adjustment.

Be sure to re-install the drums in their original positions.

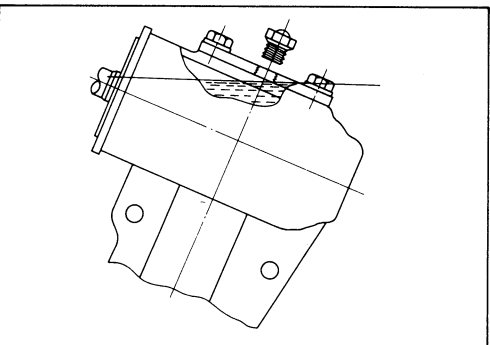
STEERING



Steering wheel play adjustment

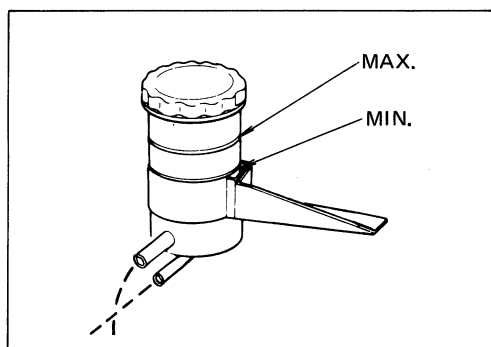
If play is excessive, first check the steering shaft and the universal joint. If there is no problem with them, unit adjustment is necessary.

Turn the adjusting screw clockwise to decrease play and counterclockwise to increase it.

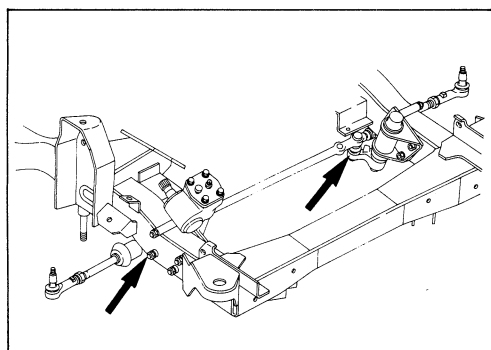


Oil level check

Remove the filler plug from the gear box and check that oil is filled to the lower edge of the filler port.

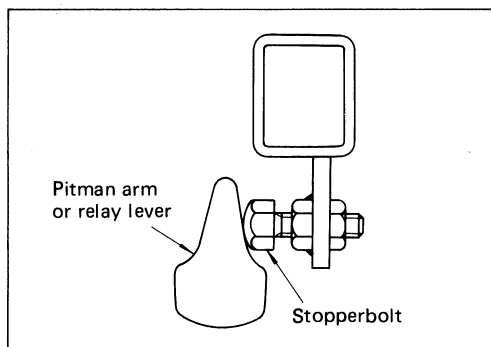


Power steering oil level

**Maximum steering angle adjustment**

The maximum steering angle of the front wheels can be adjusted with the stopper bolts under the frame side members.

1. Position each front wheel on the turning radius gauge in a straight-ahead position.
2. Set the parking brake firmly.

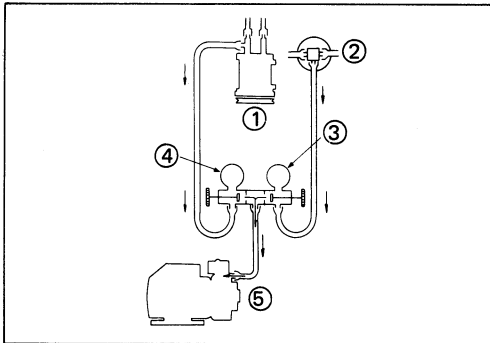


3. Adjust the inside wheel angle of each side with the stopper bolts.

Outside wheel	33°
Inside wheel	35°

Note: Maximum steering angles should be set after adjusting front wheel alignment.

AIR CONDITIONER (IF SO EQUIPPED)



Air-purging

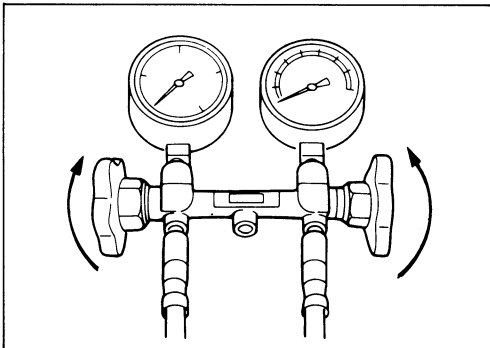
Use a vacuum pump to remove air, moisture, and other foreign matter from the system.



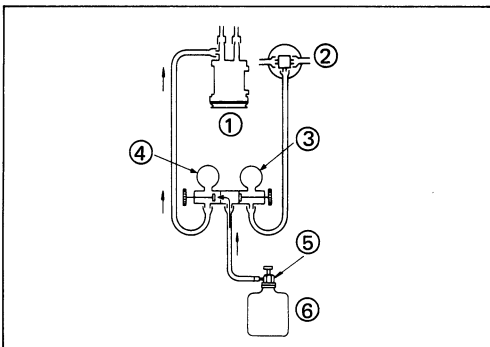
- 1 Compressor
- 2 Receiver unit
- 3 High pressure gauge
- 4 Low pressure gauge
- 5 Vacuum pump

Gauge adapter : J-25499

Gauge adapter : J-9459



1. Operate the vacuum pump.
2. Using the gauge manifold valves, continue to operate the vacuum pump until the gauge on the low pressure side reaches 740 mm Hg. Then continue pumping for 5 more minutes.
3. Close the gauge manifold valves.
4. Stop the vacuum pump.



Gas charging

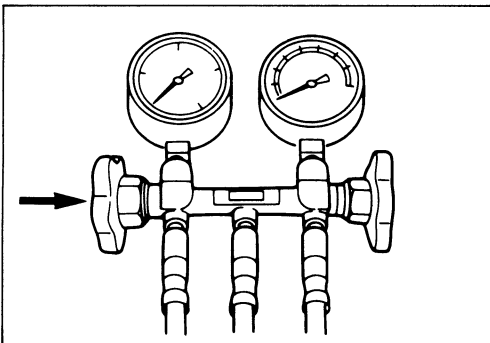
Charge the system with refrigerant after air-purging and inspection for leaks.



- 1 Compressor
- 2 Receiver unit
- 3 High pressure gauge
- 4 Low pressure gauge
- 5 Charge valve
- 6 Gas container

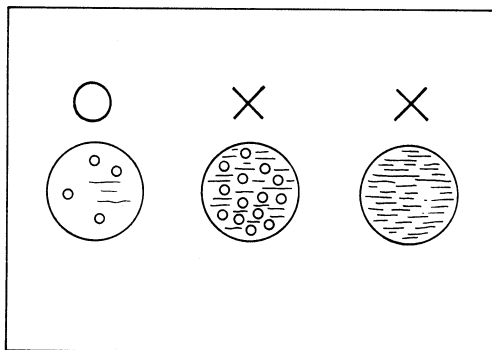
Gauge adapter : J-25499

Gauge adapter : J-9459



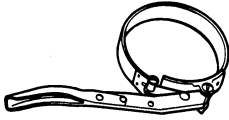
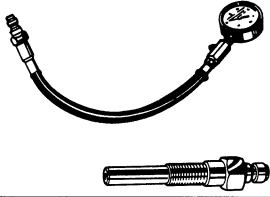
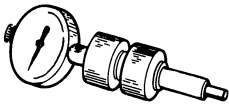
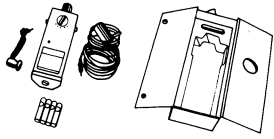
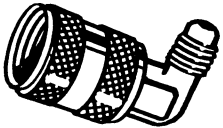
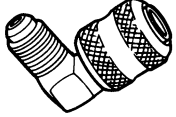
1. Load refrigerant gas into the system by opening the low pressure side valve on the gauge manifold.
2. When charging is finished, start and let the engine run at approximately 1000 rpm.
3. Close the low pressure side valve on the gauge manifold when the low pressure side gauge reaches nearly zero and the gas container is emptied.

00-44 GENERAL INFORMATION



4. When the sight glass on the receiver unit becomes clear, the system is fully charged.
5. Disconnect the charge hose from the service valves.

SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-29772	Oil filter wrench (101 mm-diesel) for extra-large C223 oil filter
		J-29762	Compression gauge (J-26999-20 adapter included) Glow plug port adapter (also available separately)
		J-28827	Static timing gauge same as J-29763
		J-28885	Tachometer (Ono Sokki)
		J-25499	Gauge adapter
		J-9459	Gauge adapter

[illegible]

SECTION 01

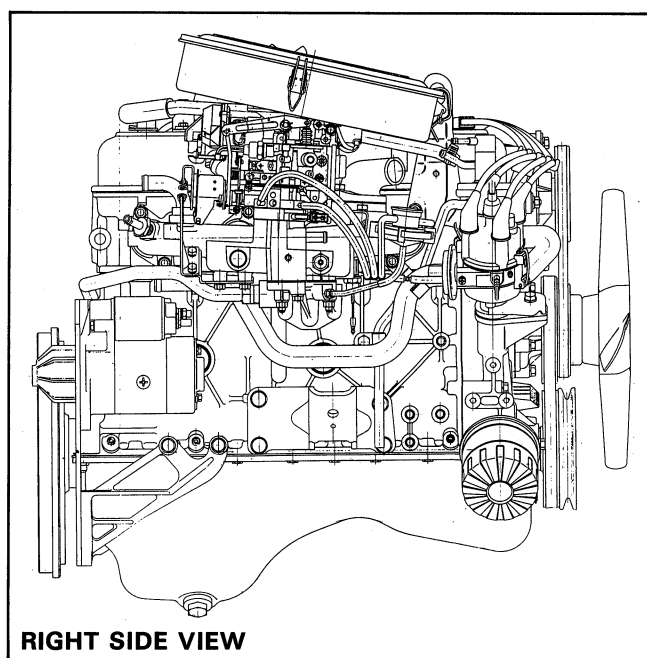
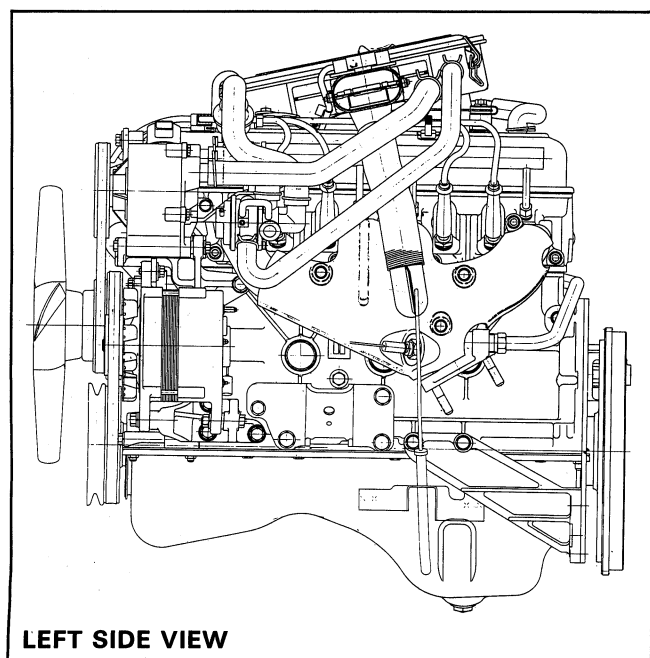
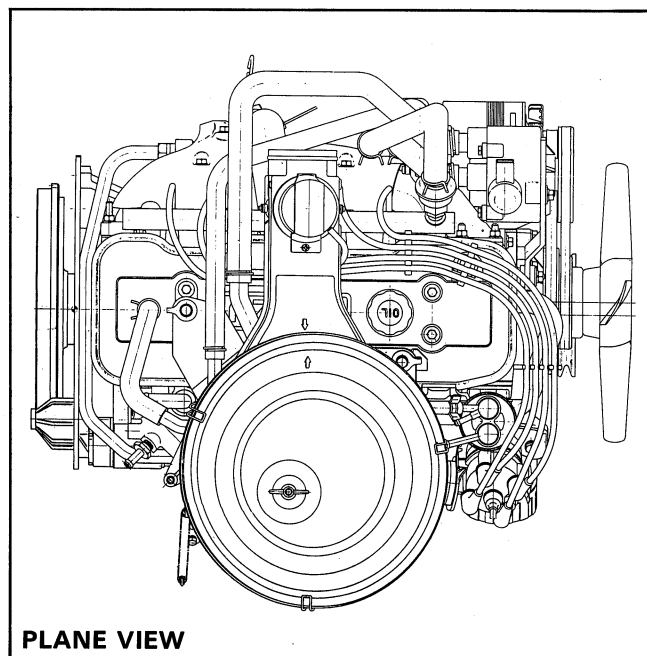
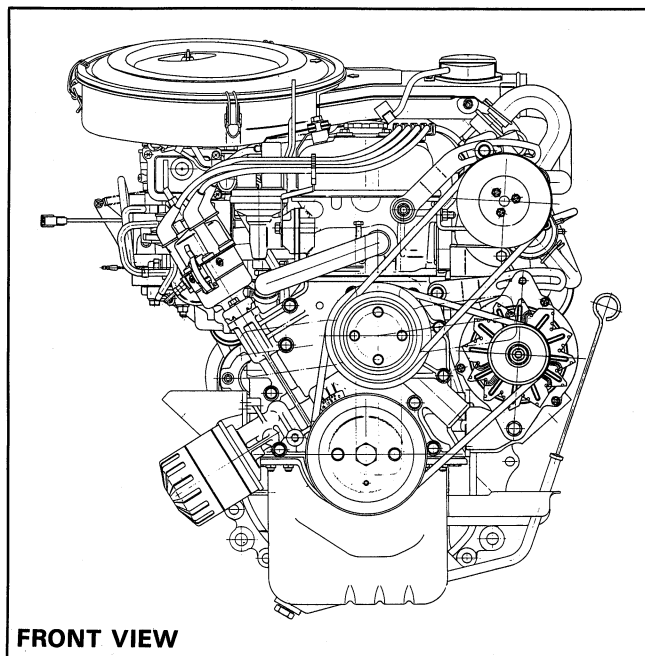
GASOLINE ENGINE

INDEX

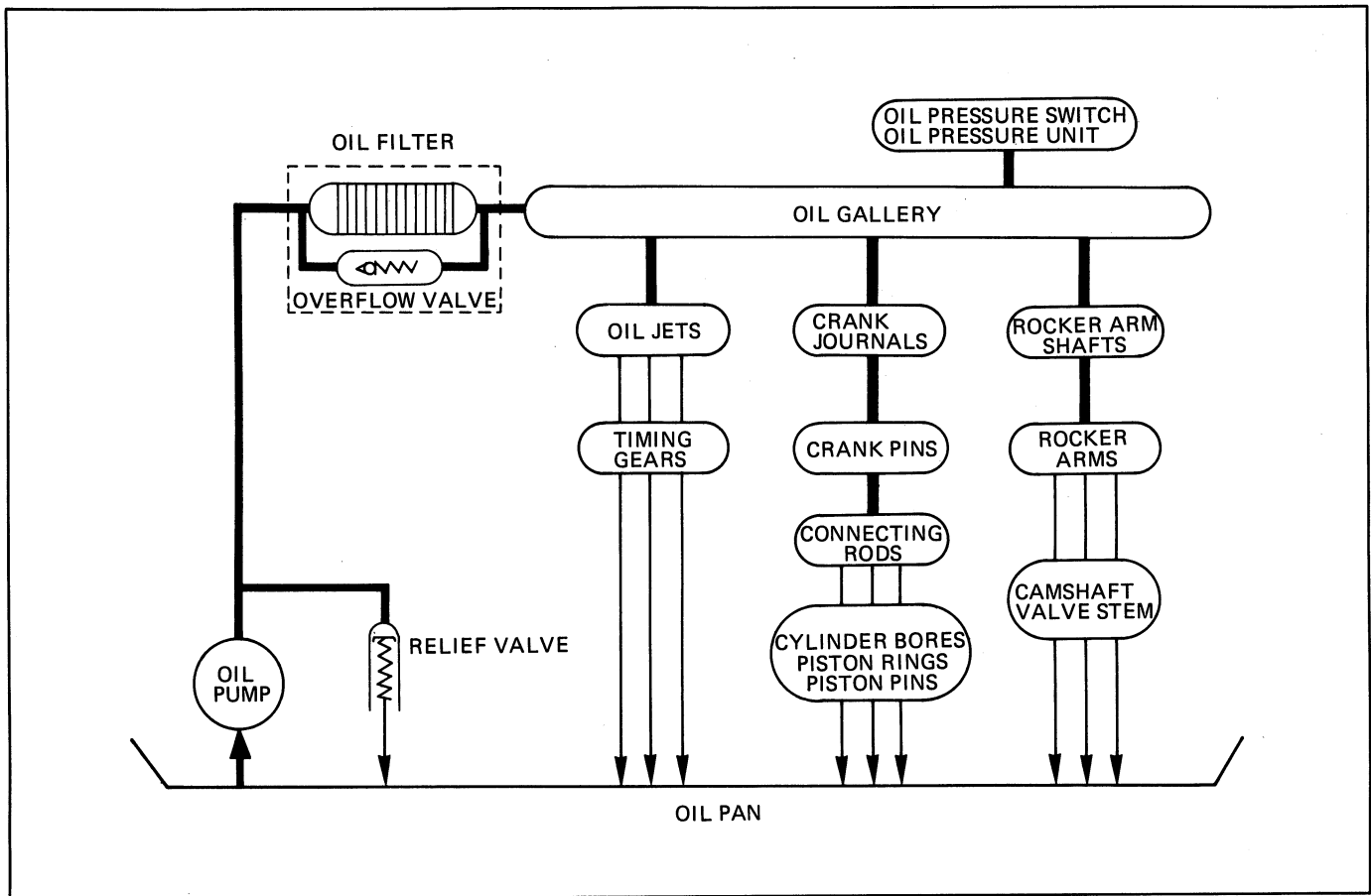
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Removal and installation	01- 13
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GENERAL DESCRIPTION

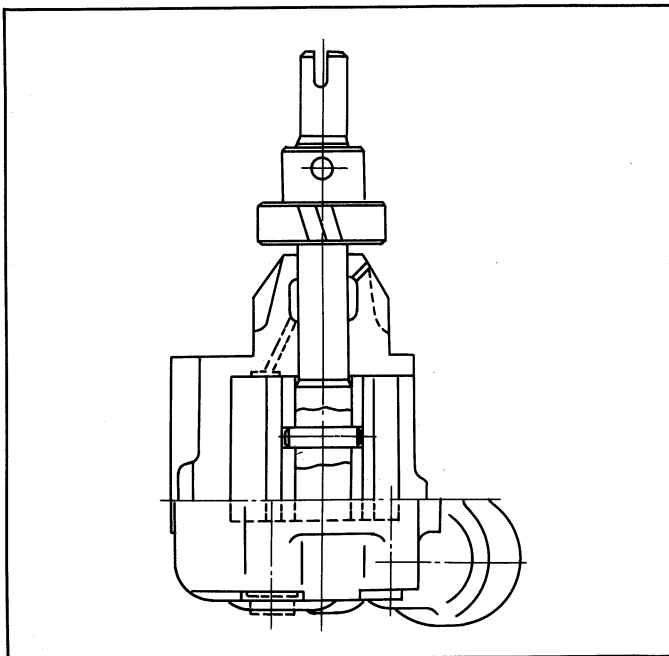
ENGINE



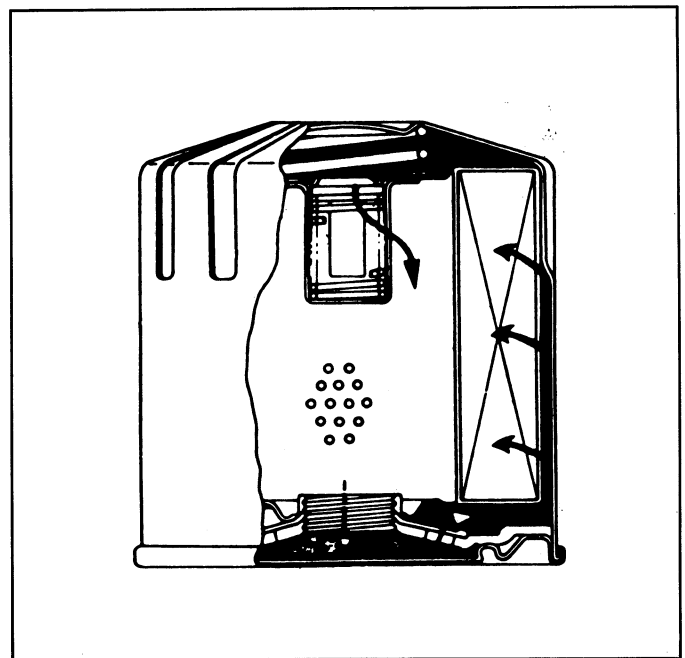
LUBRICATING SYSTEM



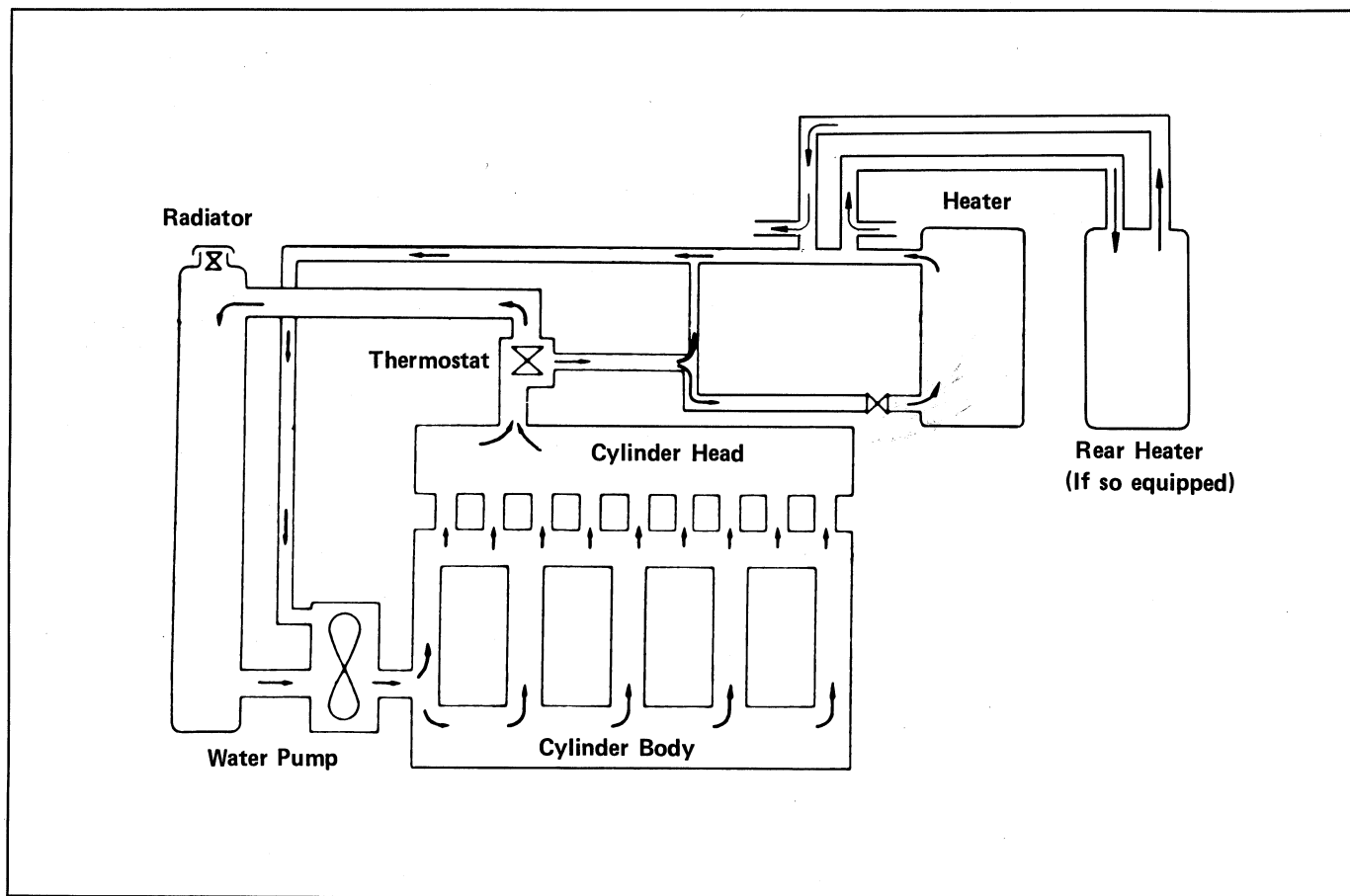
OIL PUMP



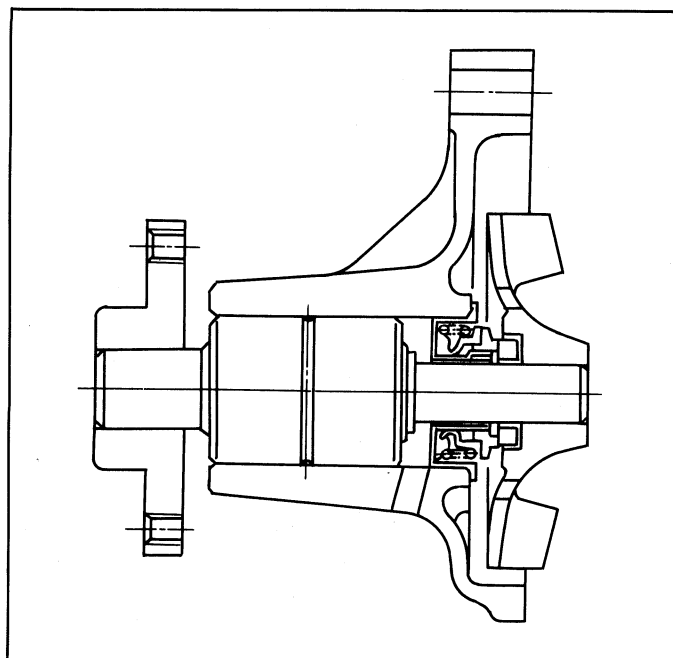
OIL FILTER



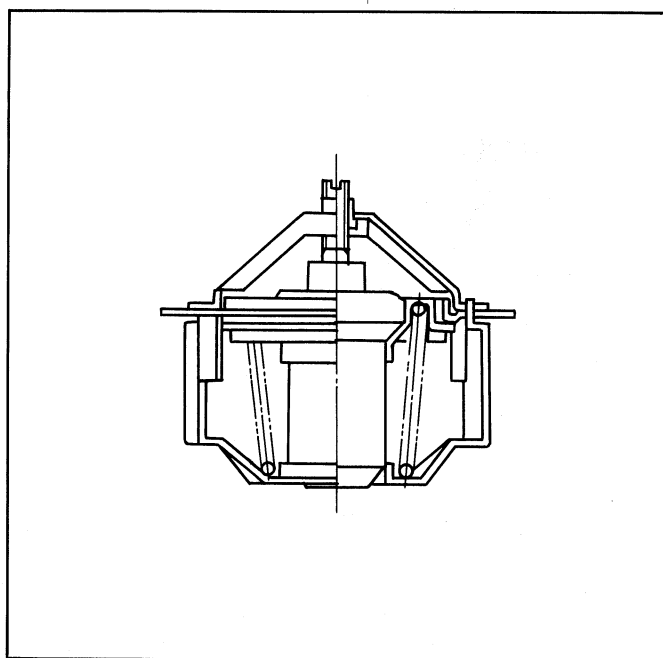
COOLING SYSTEM



WATER PUMP



THERMOSTAT



MAIN DATA AND SPECIFICATIONS

Items	Model	G200Z
ENGINE		
Engine type		Water-cooled, 4-cycle, Cross-flow, carburetor SOHC, chain drive
Combustion chamber type		"V" type
Number of cylinders x bore x stroke	mm(in.)	4 — 87 x 82 (3.42 x 3.23)
Piston displacement	Liters(cu.in.)	1.95 (119)
Compression ratio	(to 1)	8.4
Engine dimensions (length x width x height)	mm(in.)	696 x 617 x 681 (27.4 x 24.3 x 26.8)
Engine weight (dry)	kg(lbs.)	144 (318)
PISTONS		
Type		Without T slot
Material		LO-EX
Number of rings (compression rings—Oil rings)		2 — 1
VALVE SYSTEM		
Intake valves	Open at B.T.D.C degree	21
	Closed at A.B.D.C degree	65
Exhaust valves	Open at B.B.D.C degree	55
	Close at A.T.D.C degree	20
Valve clearances	Intake mm(in.)	0.15 (0.006) when cold
	Exhaust mm(in.)	0.25 (0.010) when cold
Valve head diameter	Intake mm(in.)	40.4 (1.59)
	Exhaust mm(in.)	34.0 (1.34)
IGNITION SYSTEM		
Type		Point less
Advance device		Electronic control
Method of ignition		Full transistor Battery-ignition
Ignition timing	B.T.D.C degree/rpm	6/800 (Federal only), 6/900 (California only)
Firing order		1-3-4-2
Type of advance		Centrifugal and vacuum
Spark plugs		NGK BPR 6ES-11
Spark plug size	mm(in.)	M14 P=1.25 (0.050)
Spark gap	mm(in.)	1.05 (0.040)

01-6 GASOLINE ENGINE

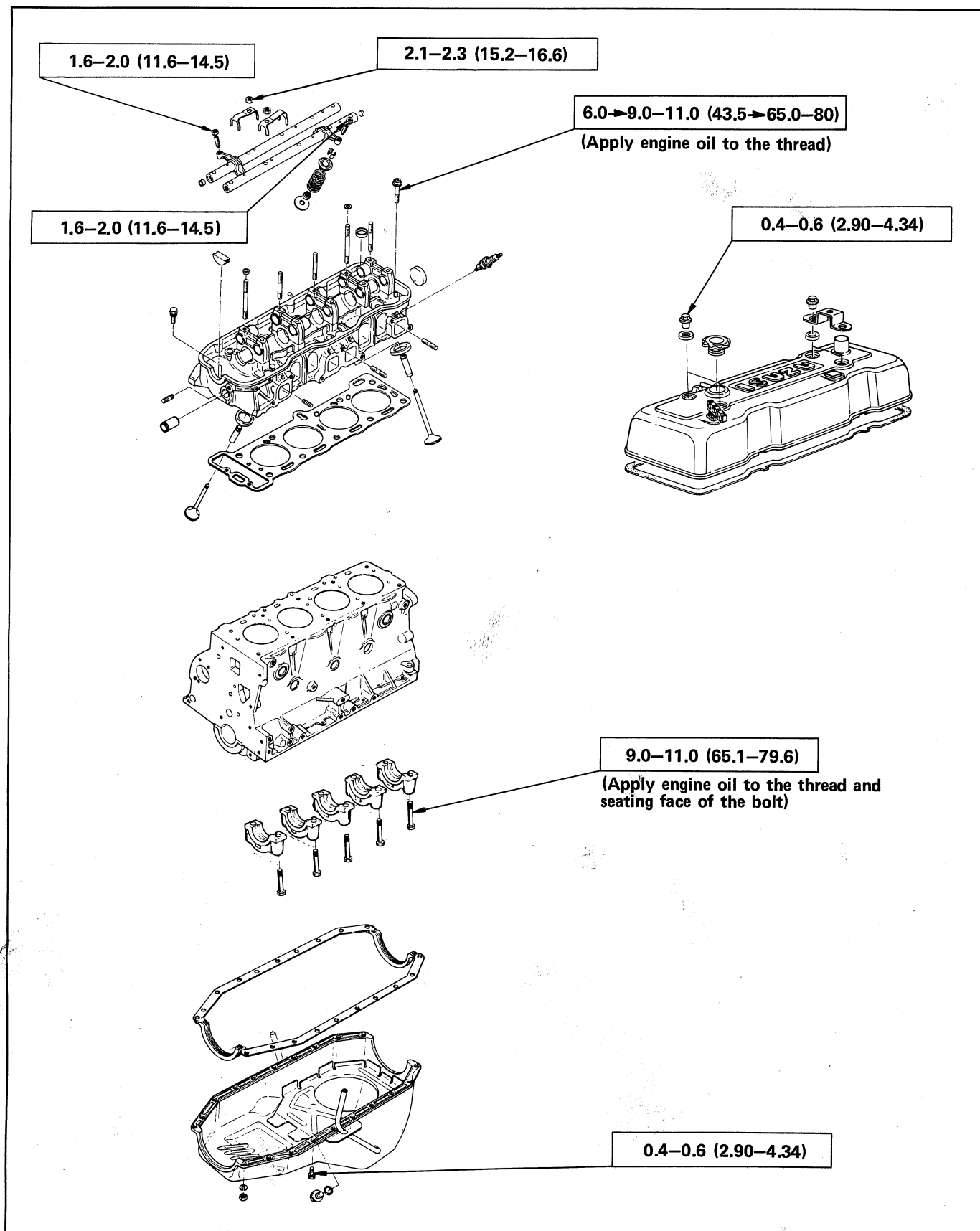
Items	Model	G200Z
LUBRICATING SYSTEM		
OIL PUMP		
Type		Trochoid type
Delivery volume	Liters/min.(gal./min.)	More than 16.0 (4.223)
At pump speed	rpm	1400
Pressure of delivery	kg/cm ² (psi)	4.0 (56.9)
Oil temperature	°C (°F)	50 (122)
Engine oil		SAE 30
Relief valve opening pressure	kg/cm ² (psi)	4.0 — 5.0 (56.9 — 71.1)
OIL FILTER		
Type		Cartridge-high-media paper element
Over-flow valve opening pressure	kg/cm ² (psi)	0.8 — 1.2 (11.4 — 17.1)
Oil capacity	Liters(gal.)	5.0 (1.3)
COOLING SYSTEM		
RADIATOR		
Type		Tubes with corrugated fins
Filler cap valve opening pressure	kg/cm ² (psi)	1.05 (14.9)
WATER PUMP		
Type		Centrifugal impeller type
Delivery volume	Liters/min.(gal./min.)	160 (42.3)
At pump speed	(rpm)	6,000
water temperature		Normal
THERMOSTAT		
Type		Wax-pellet with jiggle valve
Valve opening temperature	°C(°F)	82 (180)
Valve wide open temperature	°C(°F)	95 (203)
Fan pulley ratio		1.18 : 1
Fan outside diameter — number of blades		without A/C 330φ-4 / with A/C 390φ-7
Fan belt type		V-belt
FUEL SYSTEM		
Carburetor type		2-barrel down draft
Carburetor model		DFP340 (California only), DCH340 (Federal only)
Fuel pump type		Mechanical diaphragm
Fuel filter type		Cartridge-paper element
AIR CLEANER		
Type		Wet-paper
BATTERY		
Type		50D20R
Voltage (V) - Capacity (amp.)		12 — 50
CHARGING SYSTEM		
Generator type		Stator diode rectified alternator (LT150 — 188)
Voltage-Capacity	(V-AH)	12 — 50
Drive and rotation		V-belt, clockwise viewed from front
Speed ratio to engine	(to 1)	1.96
Regulator type		Tirrill type

Items	Model	G200Z
STARTER MOTOR		
Type		Magnet shift
Voltage-Output	(V-KW)	12 — 1.2
Gear ratio		9 : 115
DISTRIBUTOR		
Type		Full transistorized
Advancer type		Centrifugal and vacuum
CARBURETOR		
Type		Stromberg, — 2 barrel down draft

MAJOR PARTS ; FIXING NUTS AND BOLTS

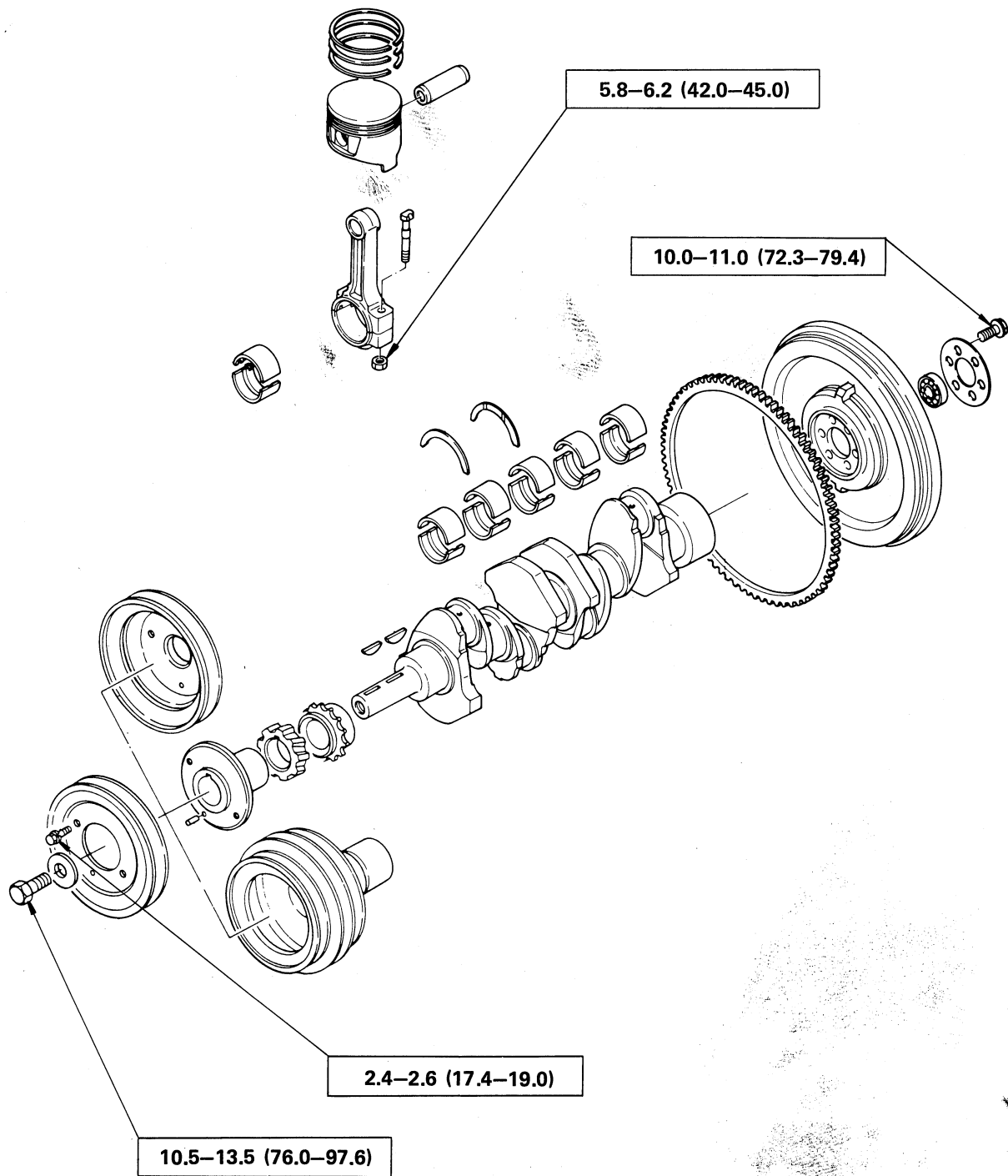
CYLINDER HEAD, CYLINDER AND OIL PAN

kg-m(ft.lbs)



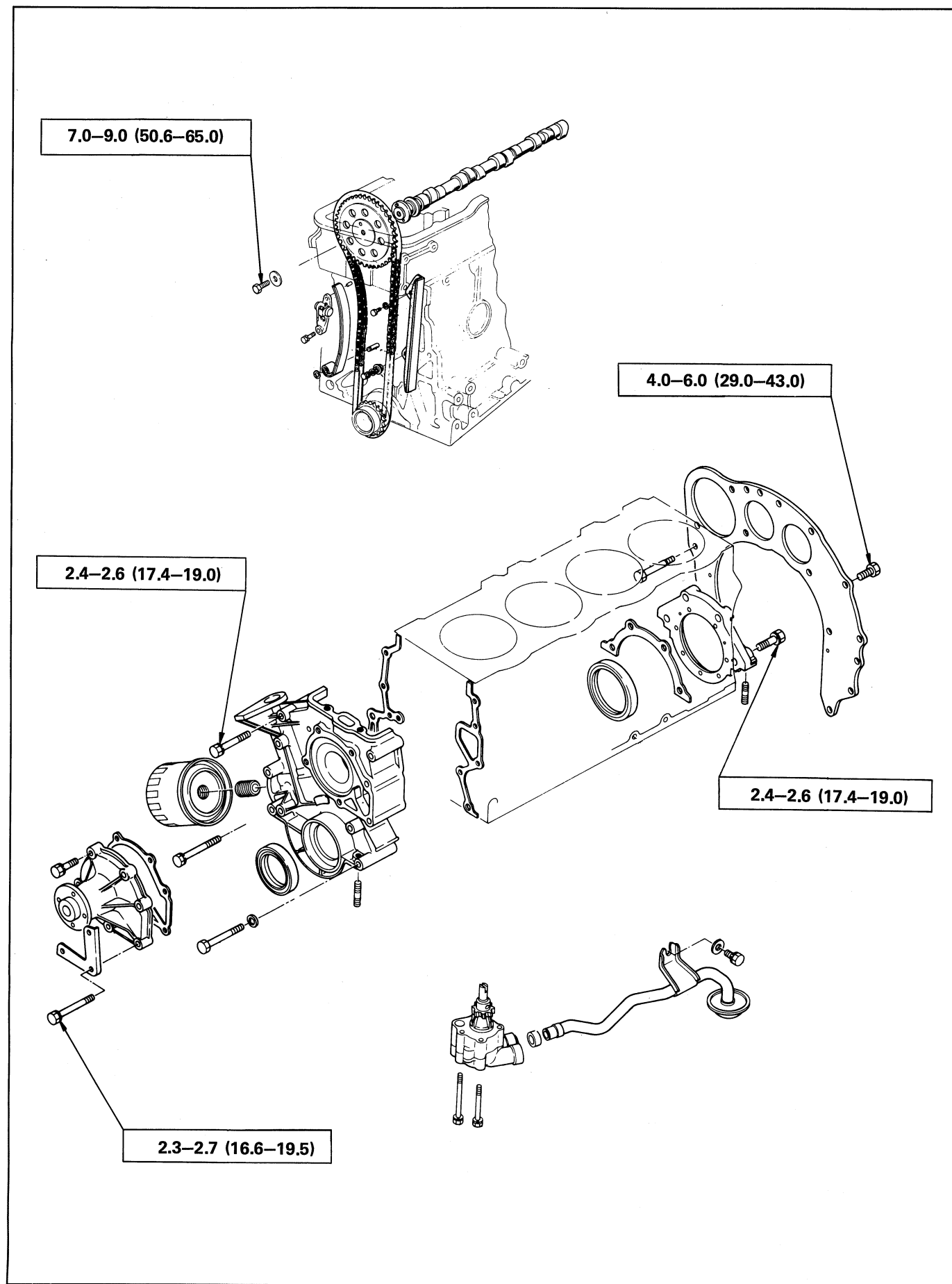
PISTON AND CRANKSHAFT

kg-m(ft.lbs)



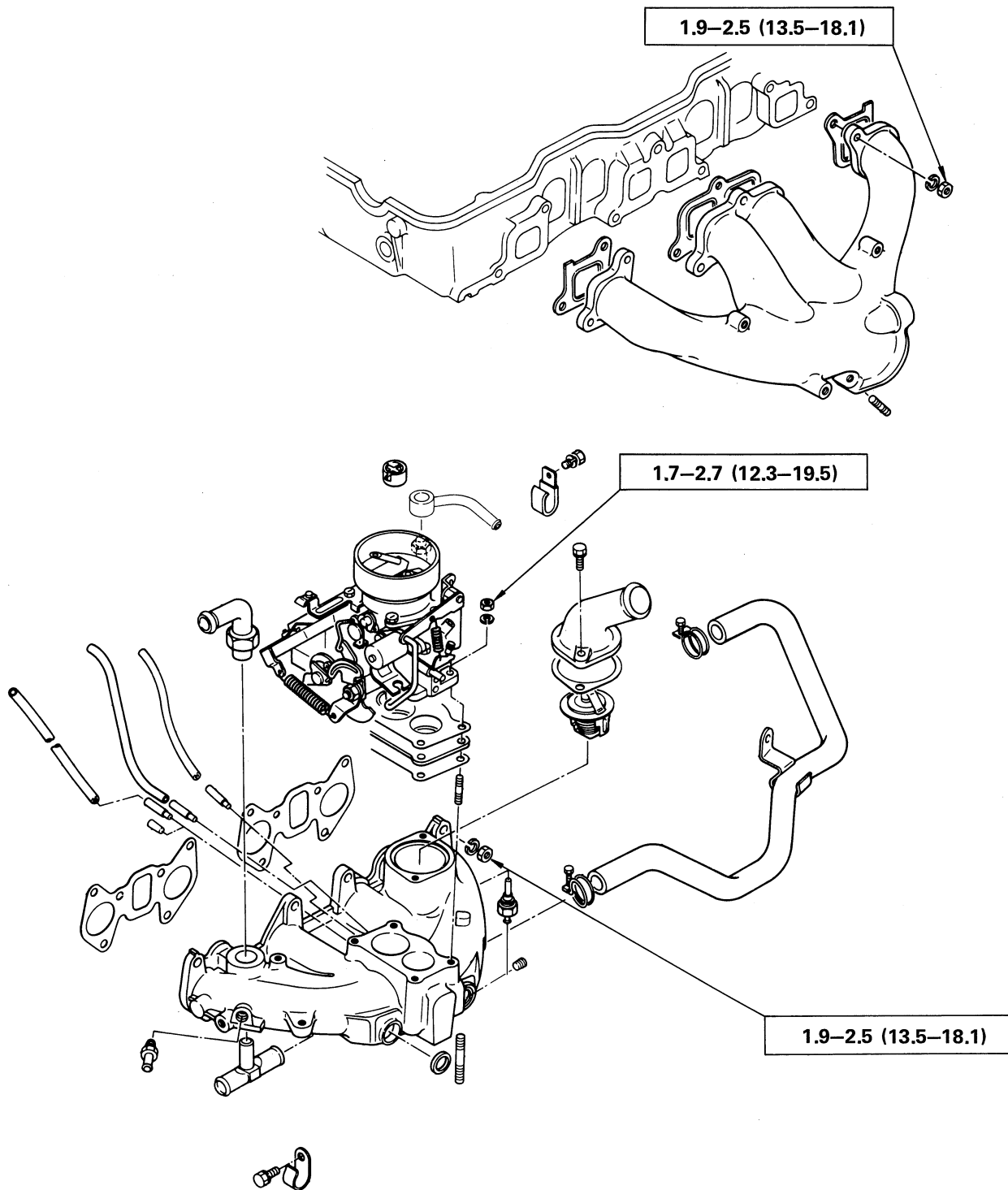
TIMING SPROCKET, GEAR CASE, WATER PUMP, FRONT COVER AND REAR COVER

kg-m(ft.lbs)

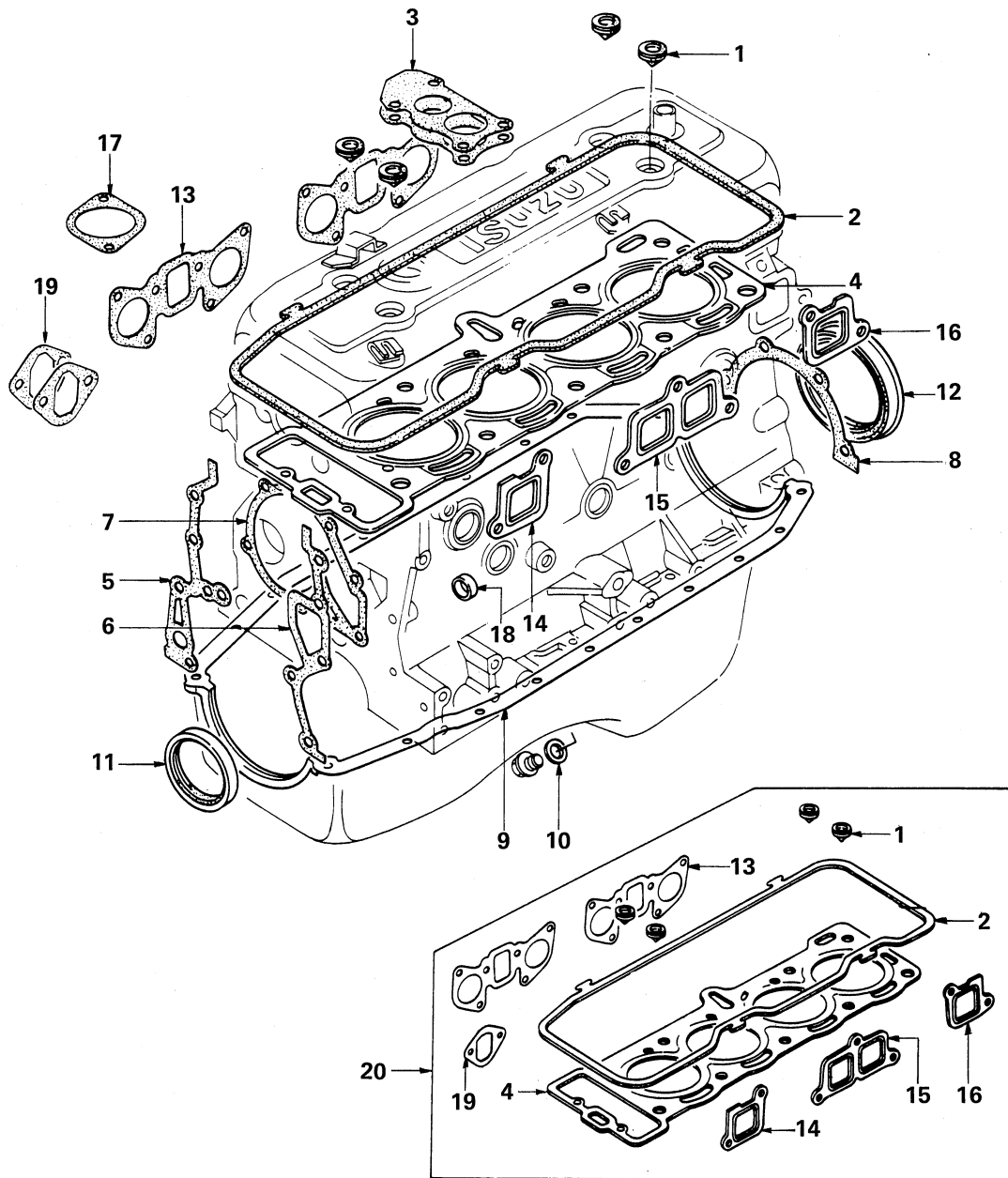


INTAKE MANIFOLD AND EXHAUST MANIFOLD

kg-m(ft.lbs)



ENGINE REPAIR KIT



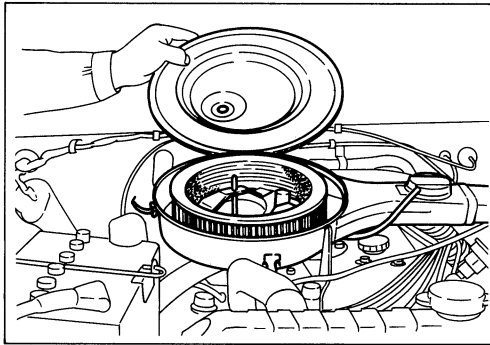
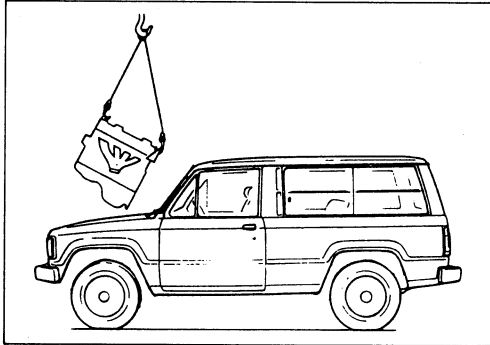
- | | |
|---|--|
| 1. Gasket ; cap nut to head cover | 11. Seal ; oil, front cover |
| 2. Gasket ; head cover to head | 12. Seal ; crankshaft, rear |
| 3. Gasket ; insulator, carb. to int. manifold | 13. Gasket ; int. manifold |
| 4. Gasket ; cyl. head to block | 14. Gasket ; No. 1 cyl. exh. manifold |
| 5. Gasket ; front cover to block (RH.) | 15. Gasket ; No. 2, 3 cyl. exh. manifold |
| 6. Gasket ; front cover to block (LH.) | 16. Gasket ; No. 4 cyl. exh. manifold |
| 7. Gasket ; water pump to frt. cover | 17. Gasket ; outlet pipe |
| 8. Gasket ; retainer to block | 18. Seal ; rubber, oil pipe to oil pump |
| 9. Gasket ; oil pan to block | 19. Gasket ; pump, heat insulator |
| 10. Gasket ; drain plug, oil pan | 20. Gasket set ; eng. top overhaul |

ENGINE ASSEMBLY



REMOVAL AND INSTALLATION

REMOVAL



Removal steps

1. Remove battery cables.
2. Scribe position of the hinges on the engine hood, remove the four bolts attaching the hinges to the engine hood and remove the engine hood.
3. Remove the undercover and drain the cooling system by opening the drain plugs on the radiator and on the cylinder block.
4. Drain the engine oil.

Removal air cleaner

1. Disconnect the PCV hose from the air cleaner body.
2. Disconnect the air hose from the AIR pump.
3. Remove the air duct from air cleaner.
4. Remove the bolts attaching the air cleaner and remove the wing nut attaching the air cleaner.
5. Lift the air cleaner slightly and disconnect the TCA hose (from thermosenser and hot idle compensator to intake manifold), then remove the air cleaner assembly.

Removal of parts at left side of engine

1. Disconnect the TCA hot air hose and remove the manifold cover.
2. Disconnect the generator wiring at the connector.
3. Remove the two nuts connecting the exhaust pipe to the engine exhaust manifold, and disconnect the exhaust pipe.
4. Take the tension off of the clutch control cable by loosening the adjusting nut.
5. Disconnect the heater hoses at heater core tubes.
6. Disconnect the oxygen sensor wiring at the connector. (California only).
7. Disconnect the rubber hose at air switching valve and vacuum switching valve (California only).
8. Remove the engine mounting nut.

Removal of parts at right side of engine

1. Disconnect the cable grounding the cylinder block to the frame.
2. Disconnect the fuel hoses from the carburetor.
3. Pull out the high-tension cable from the ignition coil.
4. Disconnect the vacuum hose from the connector at the rear part of the intake manifold.
5. Disconnect rubber hoses at canister.
6. Disconnect the accelerator control cable from the carburetor.
7. Disconnect the starter motor connections.
8. Disconnect the thermo-unit, oil pressure switch and distributor wiring at the connector.
9. Disconnect rubber hose at vacuum switch (California only).
10. Disconnect the thermo switch wiring at the connector.
11. Disconnect the ground wiring at the connector on the rear part of intake manifold. (California only).
12. Disconnect the EFE heater wiring at the connector.
13. Disconnect the carburetor solenoid valve lead and automatic choke wiring at the connector.
14. Disconnect the back-up light switch and transmission switch wiring at the connector on the rear part of the engine.
15. Remove the engine mounting nut.
16. Raise the engine slightly and remove the left side engine mounting stopper plate.

Removal of parts at front of engine



NOTICE: Remove the transmission from the engine before engine removal from vehicle (4 x 4 only). Refer to "Transfer case replacement procedure" section 05B of this manual.

1. Disconnect compressor flex hoses (If equipped).
2. Disconnect the radiator reserve tank pipe at the radiator side.
3. Disconnect the radiator upper and lower hoses from the outlet pipe and from the radiator, respectively.
4. Remove the radiator attaching bolts, and remove radiator.
5. Remove fan blade assembly.

Removal of interior parts

1. Take out the gearshift lever assembly.

Removal of parts under the floor

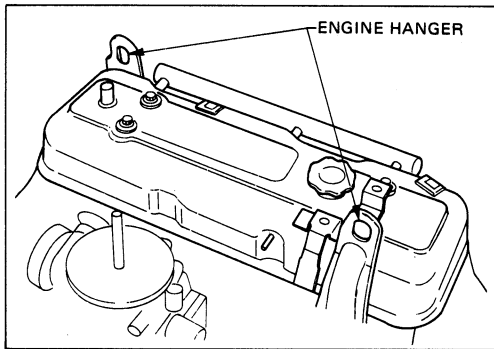
1. Remove the parking brake return spring and disconnect brake cable.
2. Disconnect the propeller shaft from the transmission. (Refer to "Propeller shaft replacement procedure" section 07 & 07A of this manual.)
3. Remove the clutch return spring.
4. Disconnect the clutch control cable from the clutch lever and remove it from engine stiffener.
5. Remove the front side exhaust pipe bracket from the transmission.

6. Disconnect the mounting clamp of front side exhaust pipe.
7. Disconnect the speedometer cable.
8. Remove the rear speedometer cable.

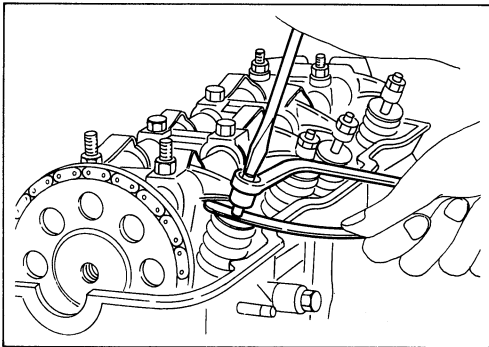
NOTICE: Check that the engine is slightly lifted before removing the rear engine mounting bolts.

Engine removal

1. Check to make certain all the parts have been removed or disconnected from the engine those are fastened to the frame side.
2. Raise the engine toward front of the vehicle.
3. Remove the transmission assembly from the engine.



INSTALLATION



Installation steps

To install the engine in the vehicle, reverse the removal procedure.

Preparation for engine installation

1. Check harnesses for damage and correct or replace with new ones as necessary.
2. Check the engine mounting rubbers for looseness or damage and tighten or replace with new ones as necessary.

Steps to be followed after engine installation

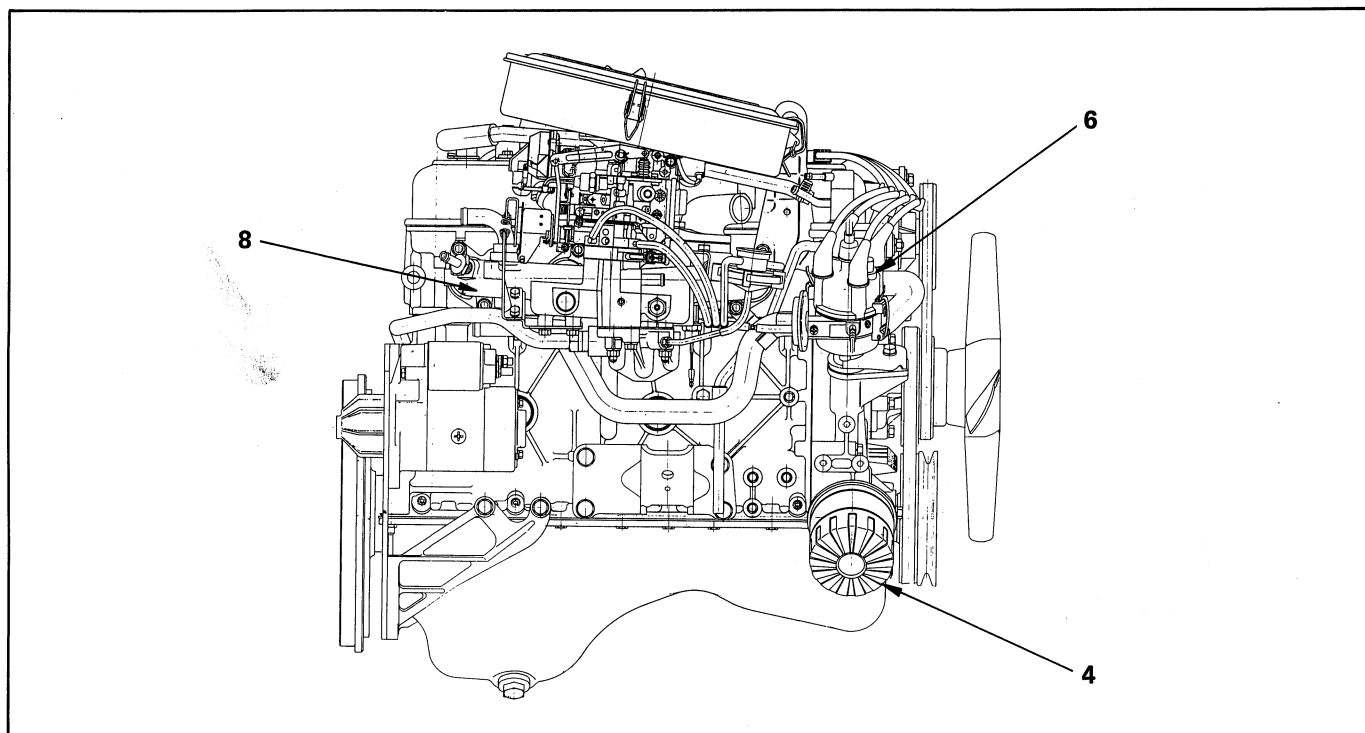
1. Fill the engine cooling system.
2. Fill the engine crankcase with engine oil.
3. Check and adjust clutch pedal free play as necessary.
4. Start and let the engine run at idle and check for leakage.
5. Adjust the following.
 - a. Check and adjust fan belt tension as necessary.
 - b. Adjust valve clearances.
 - c. Adjust ignition timing.
 - d. Adjust engine idle.





DISASSEMBLY

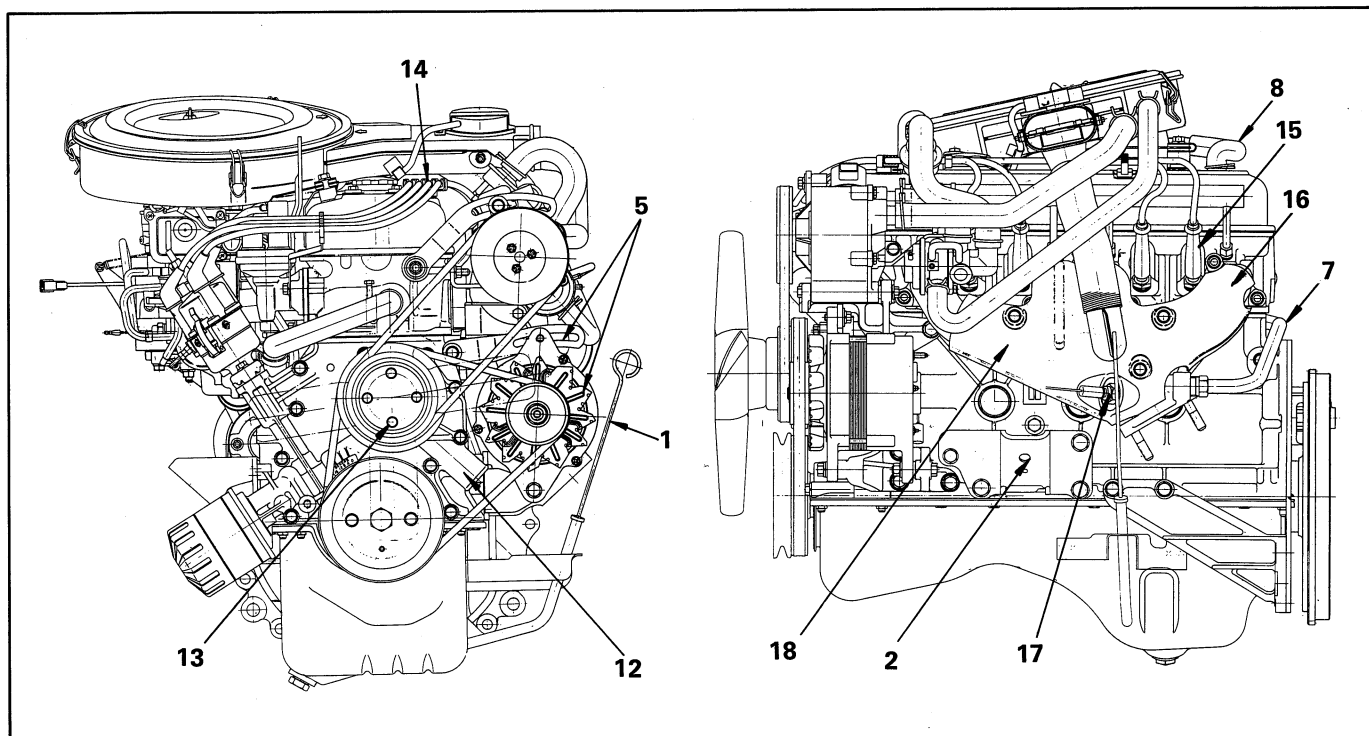
EXTERNAL PARTS (Right hand side)



Disassembly steps

- | | |
|--|---|
| 1. Aircon compressor (If so equipped) | 5. Unit ; oil pressure gauge (If so equipped) |
| 2. Bracket ; aircon compressor
(If so equipped) | 6. Distributor assembly |
| 3. Switch ; oil pressure | 7. Water hose |
| 4. Oil filter | 8. Intake manifold with carburetor |

EXTERNAL PARTS (Front and Left hand side)



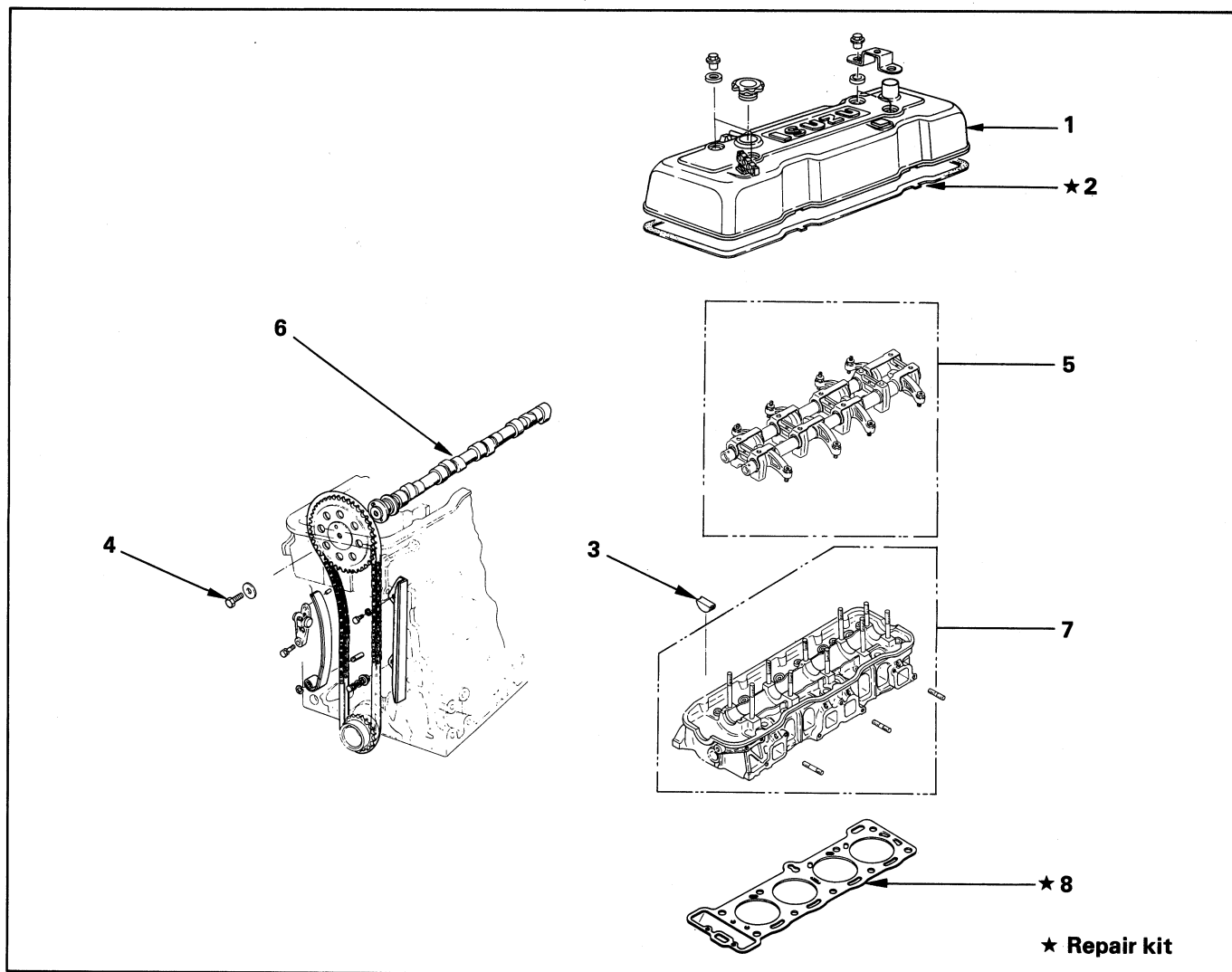
Disassembly steps

1. Oil level gauge
2. Bracket ; engine mounting
3. Pulley ; idler, oil pump, power steering (If so equipped)
4. V-Belt ; oil pump, power steering (If so equipped)
5. Generator and adjust plate
6. Oil pump with bracket ; power steering (If so equipped)
7. EGR pipe
8. Rubber hose ; blow by
- ★ Installation engine assembly to engine stand, then remove the engine hanger.
9. Pulley assembly ; tension, aircon compressor (If so equipped)
10. Belt ; aircon compressor (If so equipped)
11. Belt ; Generator
12. Radiator hose ; water pump to radiator lower
13. Fan and clutch assembly
14. High-tension cord
15. Spark plug
16. Heat protector
17. O2 sensor (California only)
18. Exhaust manifold

INTERNAL PARTS

MAJOR COMPONENTS

CYLINDER HEAD ASSEMBLY, CAMSHAFT AND ROCKER ARM SHAFT ASSEMBLY



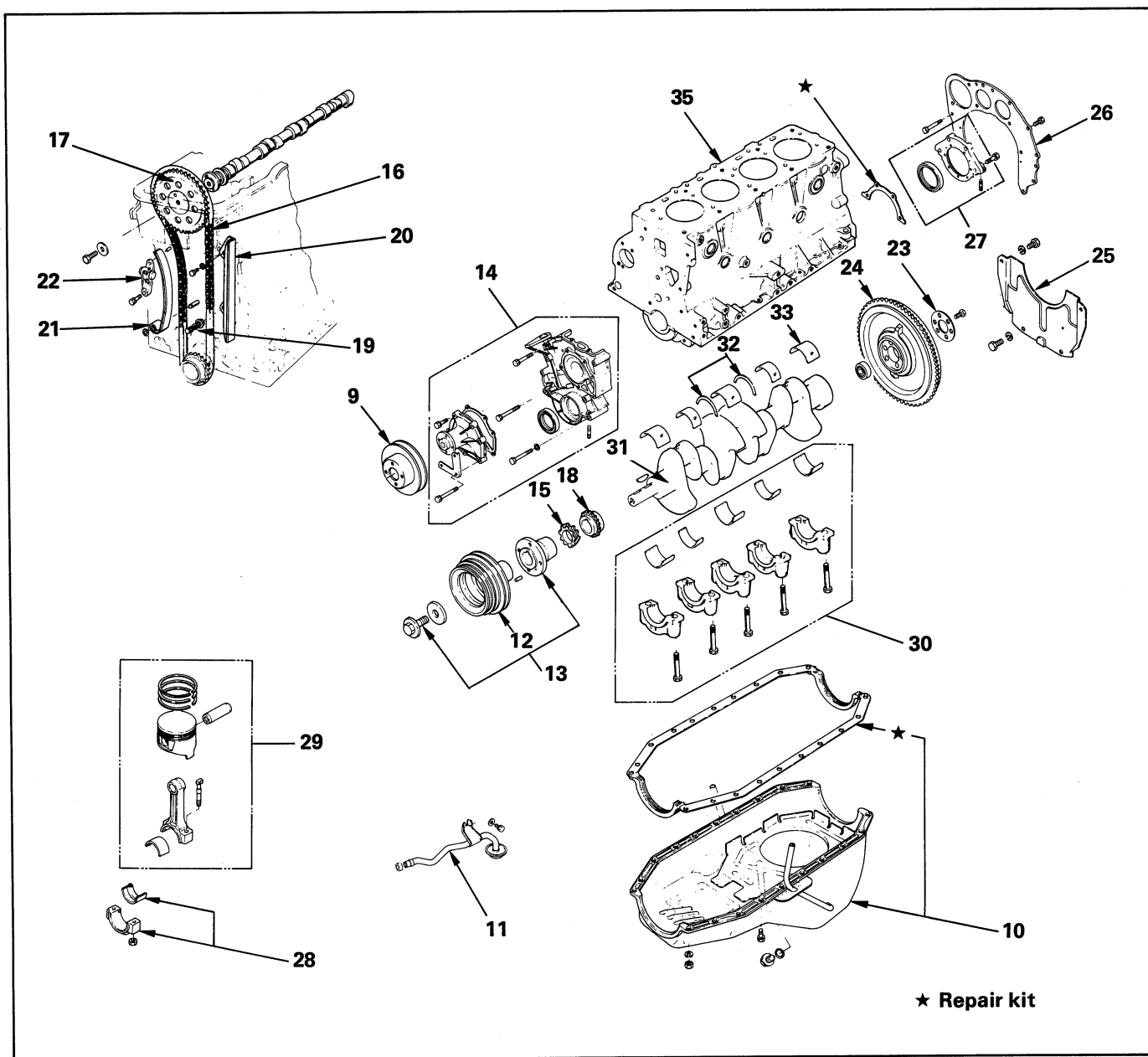
Disassembly steps-1

- 1. Cover ; cylinder head
- 2. Gasket ; head cover
- 3. Rubber plug ; front
- ▲ 4. Bolt ; camshaft sprocket

- ▲ 5. Rocker arm shaft assembly
- 6. Camshaft
- ▲ 7. Cylinder head assembly
- 8. Gasket ; cylinder head

Invert engine assembly

CYLINDER BODY AND TIMING MECHANISM

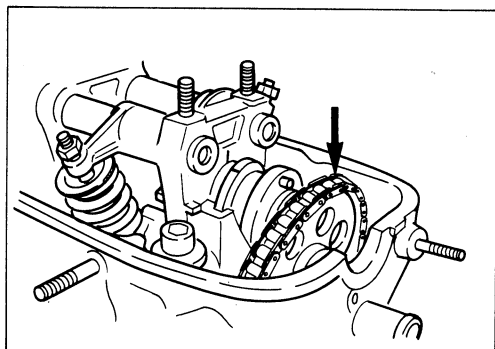


Disassembly steps-2

- | | |
|---|---|
| 9. Plate, spacer, and fan puller | 22. Automatic adjuster |
| 10. Oil pan and gasket | 23. Washer ; flywheel |
| ▲ 11. Oil pipe | 24. Flywheel for model with manual transmission |
| 12. Crank pulley | 25. Under cover |
| 13. Boss ; and bolt | 26. Rear plate |
| 14. Front cover assembly with water pump and oil pump | 27. Rear oil seal retainer |
| 15. Pinion ; oil pump | 28. Caps ; connecting rod with bearings |
| 16. Timing chain | 29. Piston and connecting rod with bearings |
| 17. Camshaft sprocket | ▲ 30. Caps ; crankshaft with bearings |
| 18. Timing wheel ; crankshaft | 31. Crankshaft assembly |
| 19. Oil jet | 32. Thrust washer |
| 20. Timing chain guide | 33. Bearings ; crankshaft |
| 21. Timing chain tensioner | 34. Cylinder body assembly |

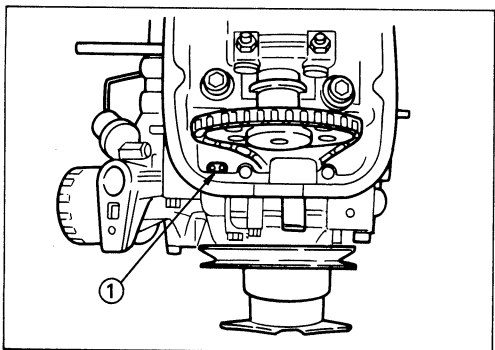


Important operations



4. Bolt ; camshaft sprocket

Leave the camshaft sprocket with the timing chain in position between the chain guide and the chain tensioner.

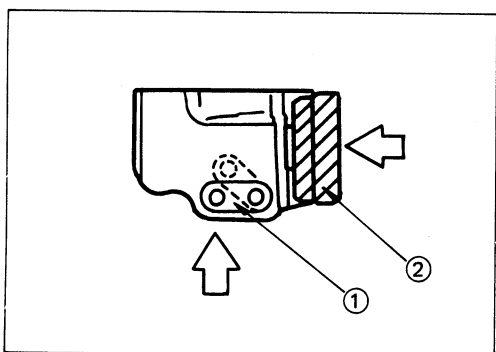


5. Rocker arm shaft assembly.

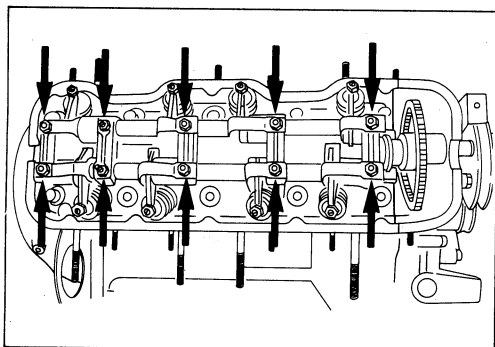
Release tension on the automatic adjuster prior to removal of the rocker arm shaft assembly.

<Steps for releasing>

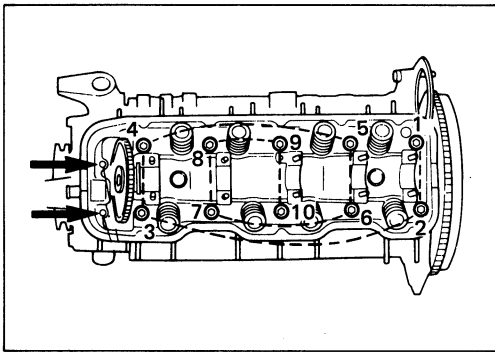
- (1) With a screw driver or equivalent depress, the lock lever ① on the automatic adjuster rearward.



- (2) Push in on the automatic adjuster shoe ① and lock it in retracted position by releasing the lever ②.



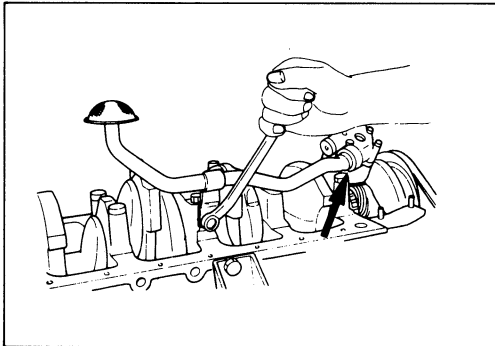
- (3) Loosen the rocker arm shaft bracket nuts in sequence starting with the outer ones, and remove them together with the brackets.



7. Cylinder head assembly

- (1) Remove the bolts (indicated by the arrows) fastening the cylinder head to the front cover.
- (2) Loosen the cylinder head bolts in sequence starting with the outer ones, then remove the bolts and the cylinder head assembly.

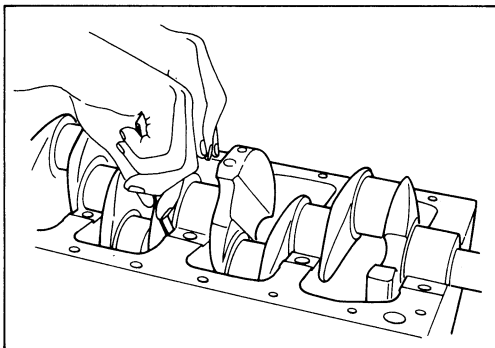
Wrench : J-24239-01



11. Oil pipe

Remove the clip fixing the oil pipe.

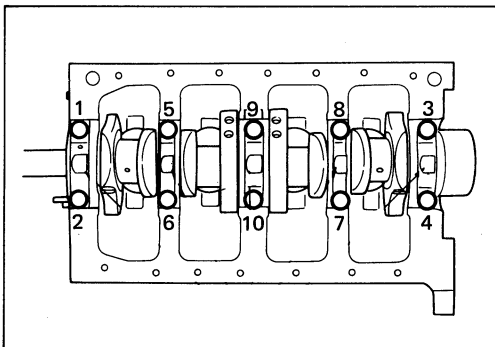
Remove the oil pipe from the oil pump.



30. Cap ; crankshaft with bearing

Measure the amount of crankshaft end play before removing the bearing caps.

	mm(in.)	
	Standard	Limit
End play	0.06 — 0.240 (0.0024 — 0.0094)	0.3 (0.012)

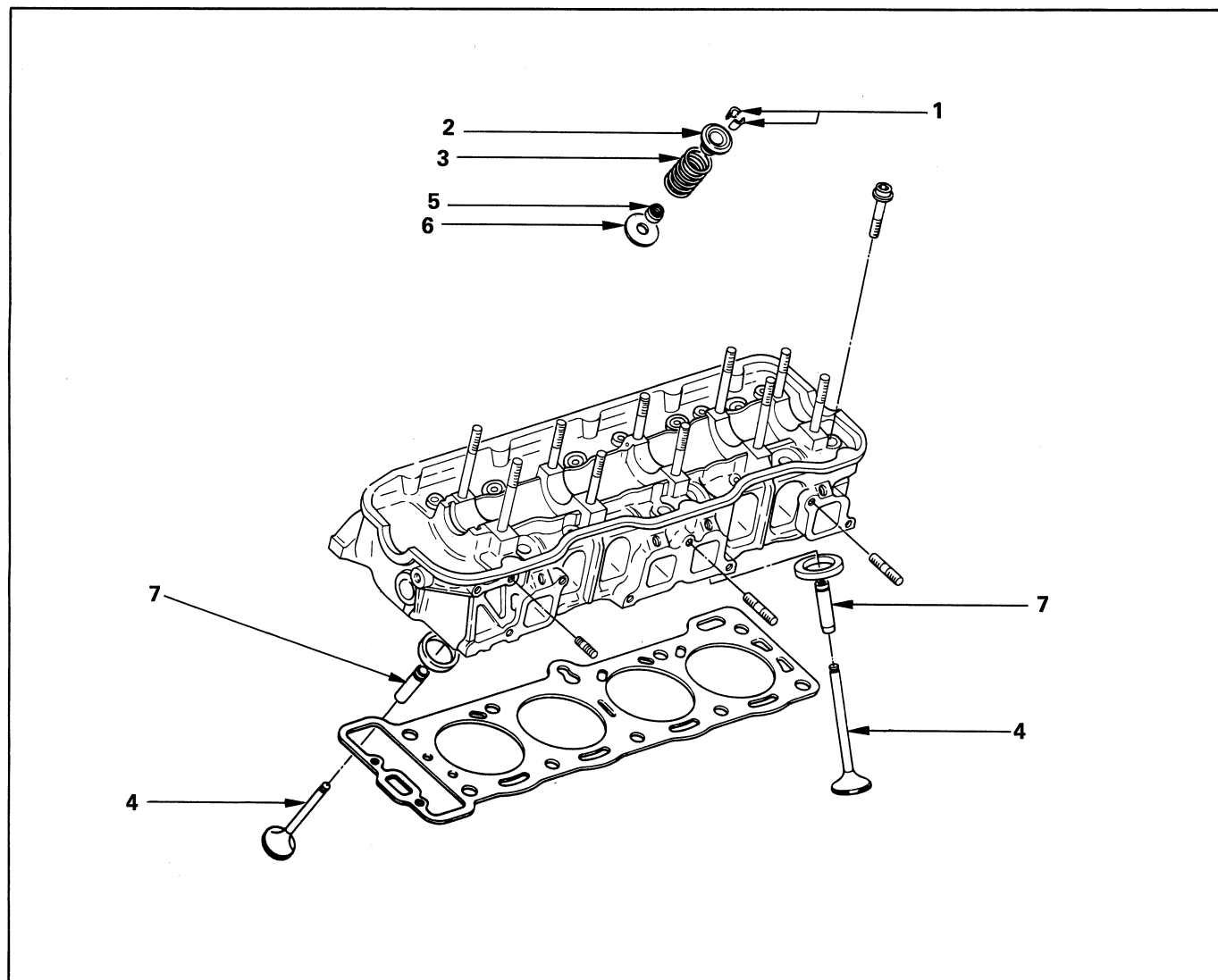


Loosen the bearing cap bolts in sequence starting with the outer ones.

Remove the bolts and bearing caps with the bearings.

MINOR COMPONENTS

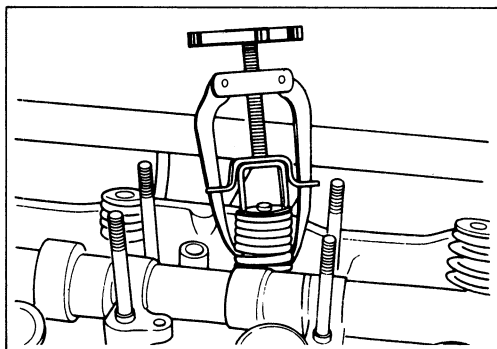
CYLINDER HEAD



Disassembly steps

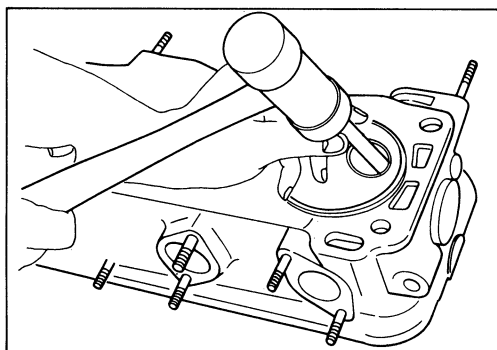
- ▲ 1. Collar ; split
- 2. Spring cap ; upper
- ▲ 3. Valve spring
- 4. Valve

- 5. Oil controller ; valve guide
- 6. Cap ; valve spring, lower
- ▲ 7. Guide ; valve

**Important operations****1. Split collar**

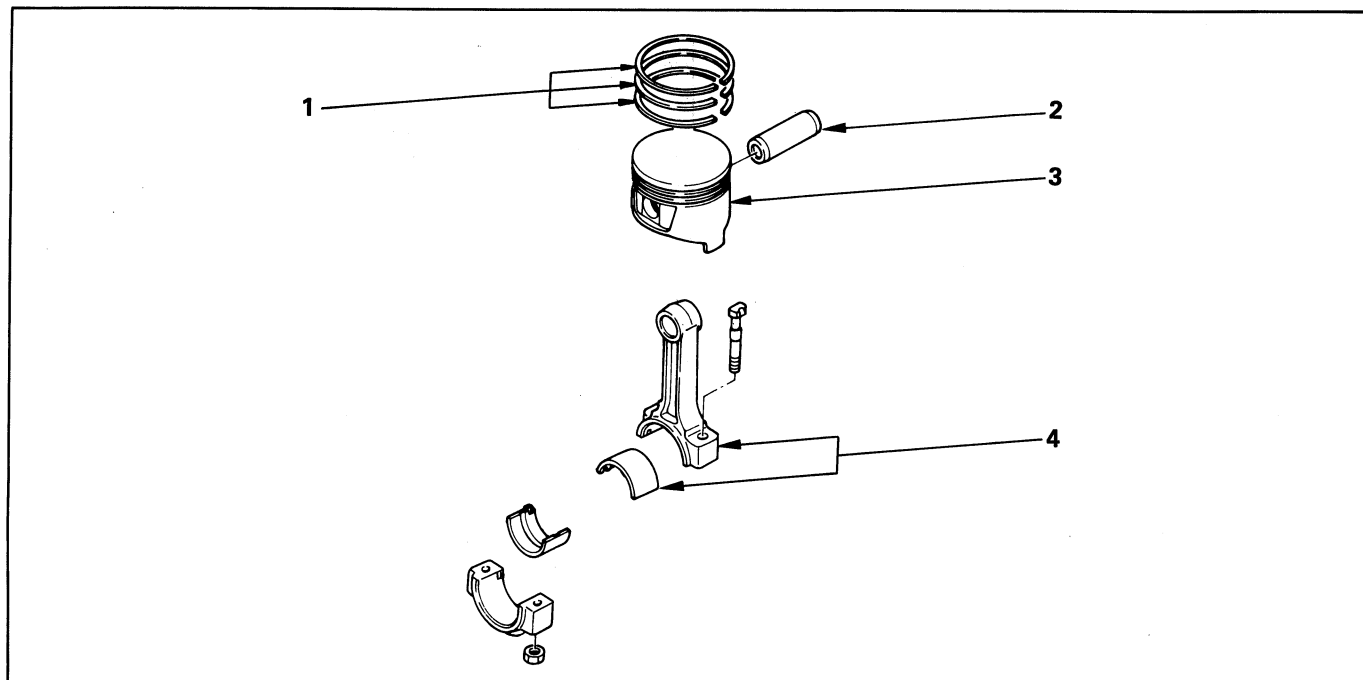
Compress the spring with valve spring compressor and remove the split collar.

Compressor : J-26513-A

**7. Guide ; valve**

Remover : J-26512-1

PISTON AND CONNECTING ROD



Disassembly steps

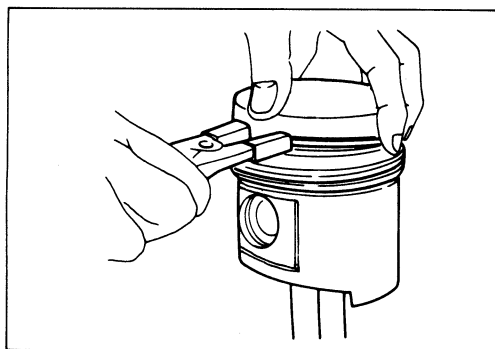
- ▲ 1. Piston rings
- ▲ 2. Piston pin
- 3. Piston
- 4. Connecting rod with bearing



Important operations

1. Piston rings

Remove the piston rings using piston ring remover or equivalent.



2. Piston pin

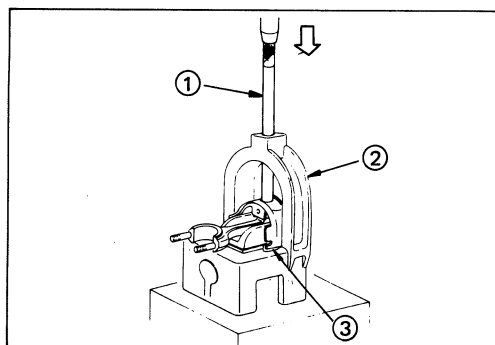
Remover and installer : J-24086

1 Remover : J-24086-8

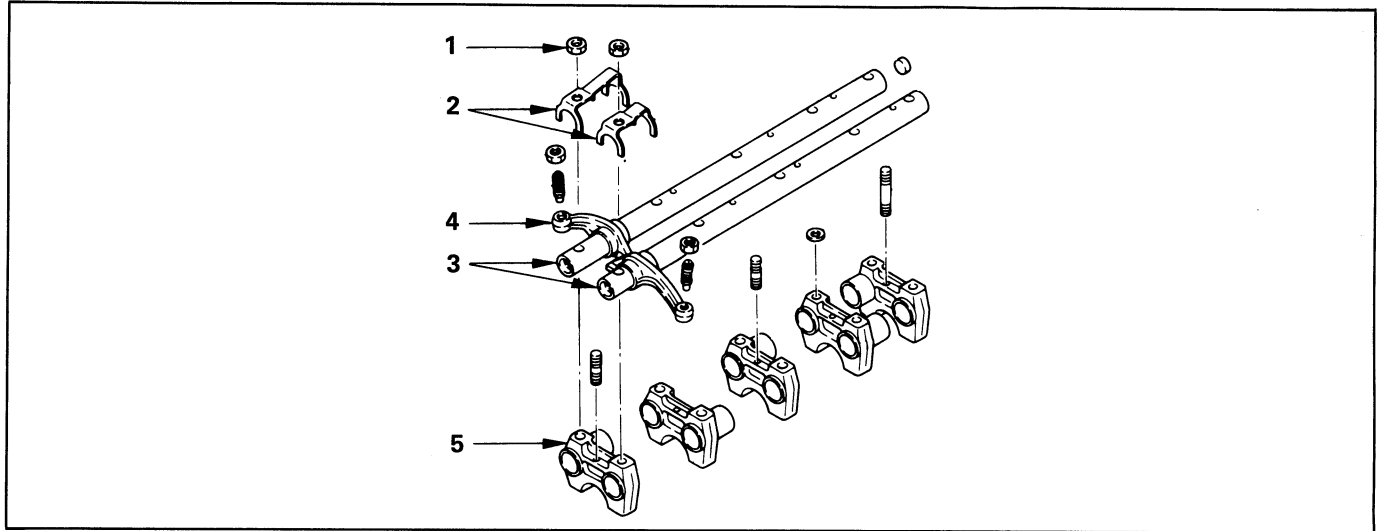
2 Base fixture : J-24086-10

3 Piston support : J-33948

Press the piston pin out of the connecting rod.



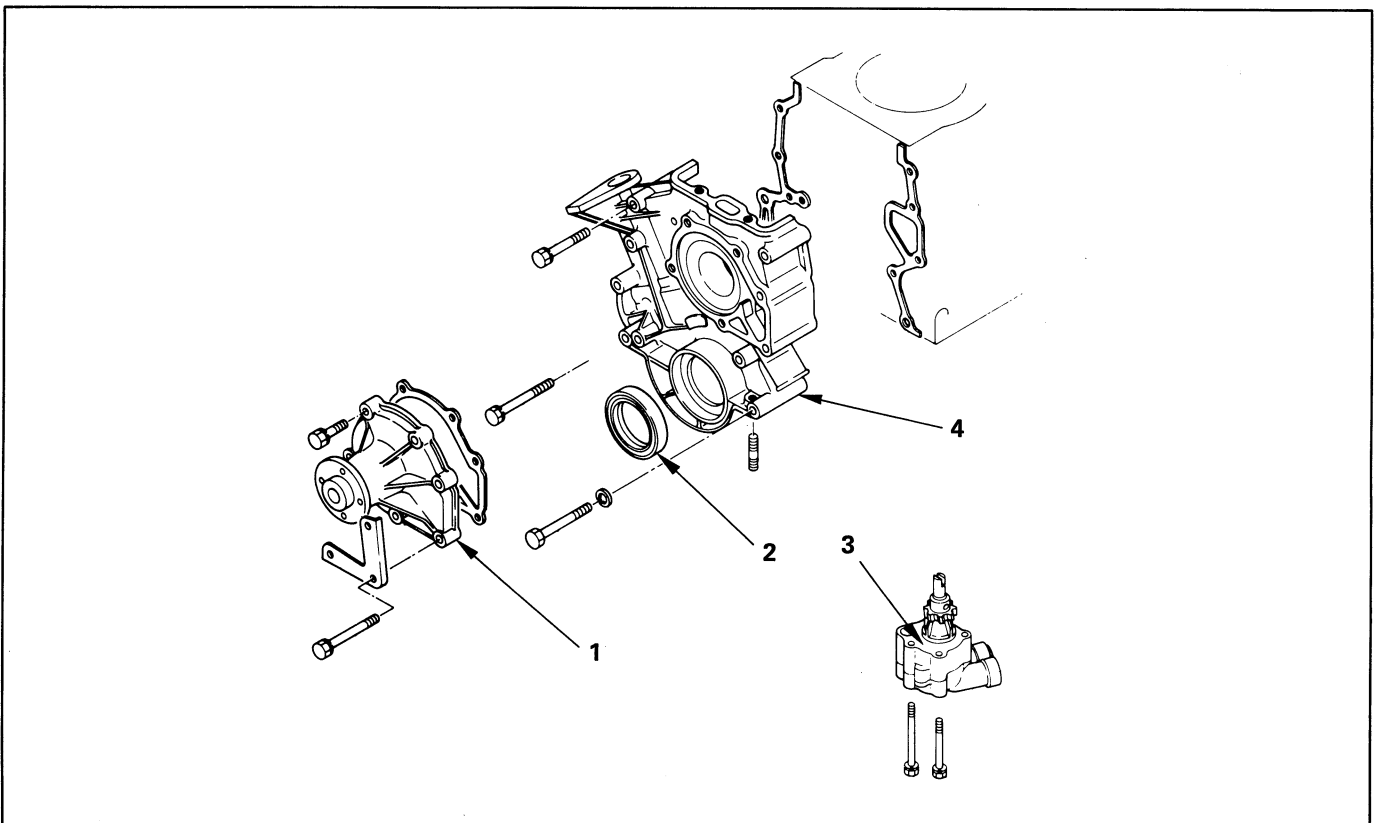
ROCKER ARM AND SHAFT ASSEMBLY



Disassembly steps

- | | |
|-----------------------------|-------------------------------|
| 1. Nut ; rocker arm bracket | 4. Rocker arm |
| 2. Spring ; rocker arm | 5. Bracket ; rocker arm shaft |
| 3. Shaft ; rocker arm | |

FRONT COVER ASSEMBLY

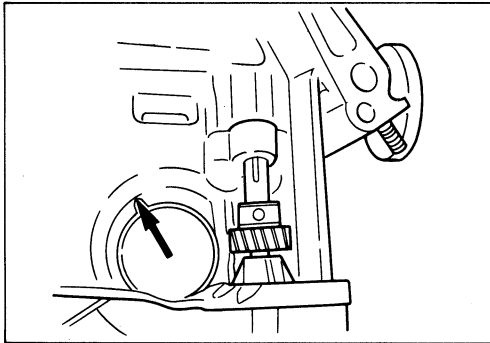


Disassembly steps

- | | |
|---------------|----------------|
| 1. Water pump | 3. Oil pump |
| ▲ 2. Oil seal | 4. Front cover |



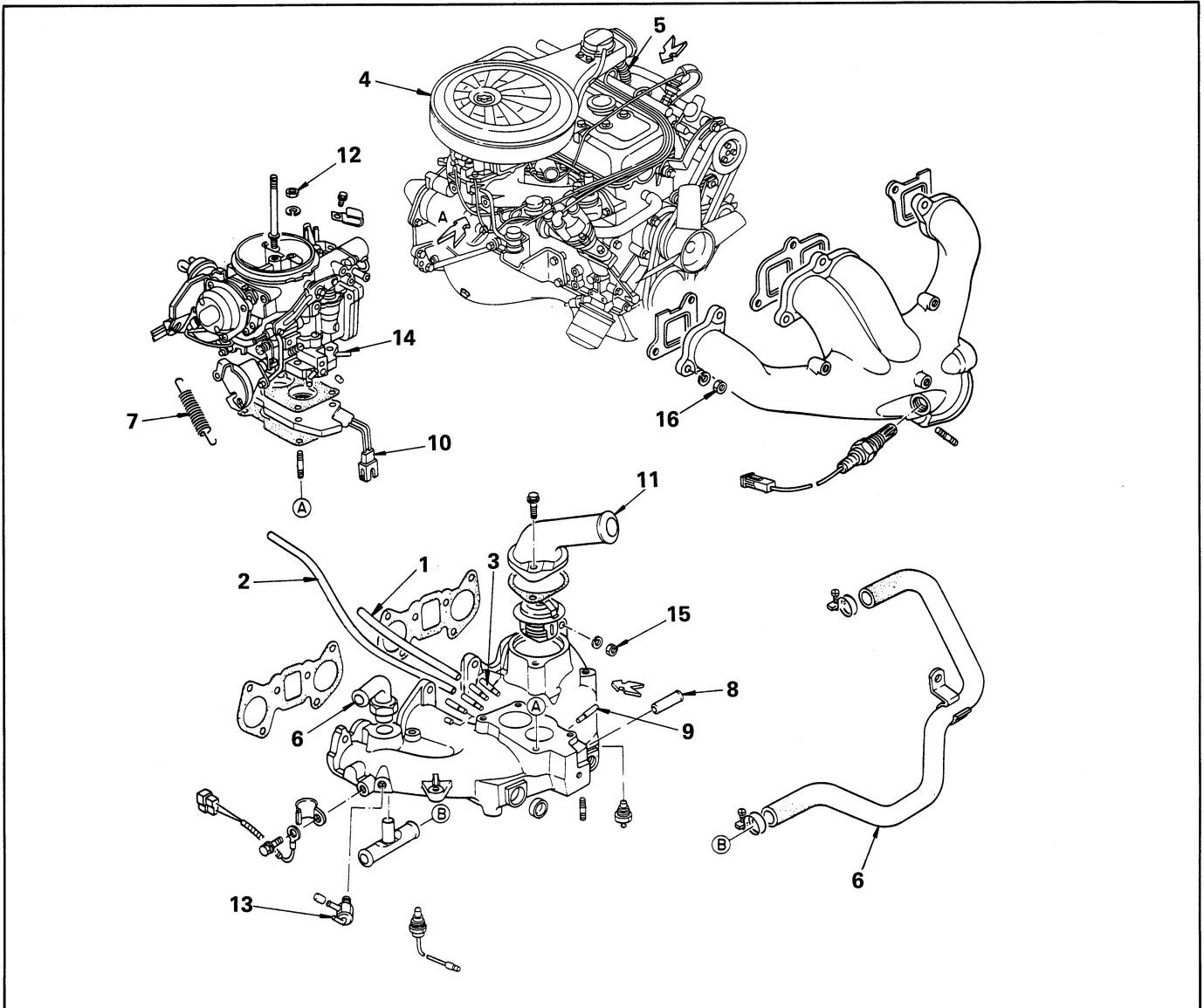
Important operation



2. Oil seal

Remove the oil seal by driving the edge of a screw driver into the cutaway portion at the rear of the front cover.

INLET AND EXHAUST MANIFOLD



Disassembly steps

- | | |
|---------------------------------|---------------------------------------|
| 1. Hose ; P.C.V. | 9. Pipe ; purge |
| 2. Hose ; idle compensator | 10. EFE heater |
| 3. Pipe ; P.C.V. | 11. Water outlet |
| 4. Air cleaner assembly | 12. Attaching nuts ; carburetor |
| 5. Nipple ; heater | 13. Connector ; M/VAC |
| 6. Hose ; by pass and heater | 14. Carburetor |
| 7. Return spring ; throttle | 15. Attaching nuts ; inlet manifold |
| 8. Pipe ; mixture control valve | 16. Attaching nuts ; exhaust manifold |



INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

CYLINDER BODY



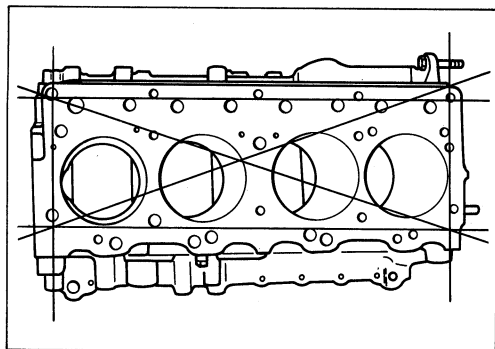
Visual check

Clean and inspect for damage or other abnormal conditions.



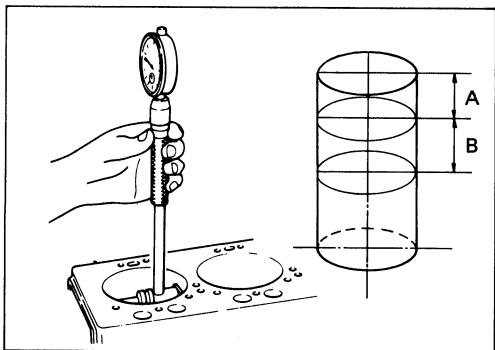
Distortion of upper face

With the dowels removed, check the cylinder body upper face for distortion in directions diagonally and across the face as shown, using a straight edge and a feeler gauge.



mm(in.)

Standard	Limit
0.05 (0.002) or less	0.4 (0.0157) or less



Cylinder bore

Measuring points : A = Approx. 8 mm (0.315 in.)

B = Approx. 70 mm (2.76 in.)

mm(in.)

Standard	Limit	Max. bore dia.
87 (3.425)	0.2 (0.0078)	88.04 (3.466)



Cylinder Reboring Procedure

1. Determine the size of the oversize pistons to be installed according to the largest bore diameter.
2. When the oversize is determined, measure the outside diameter of the pistons at a grading point below the upper face of the piston (grading positions) and in a direction at a right angle to the crankshaft.

Calculate the cylinder bore diameter to be obtained after reboring, using the following formula:

$$\begin{aligned} \text{Cylinder bore diameter (after boring)} \\ = P + C - H \end{aligned}$$

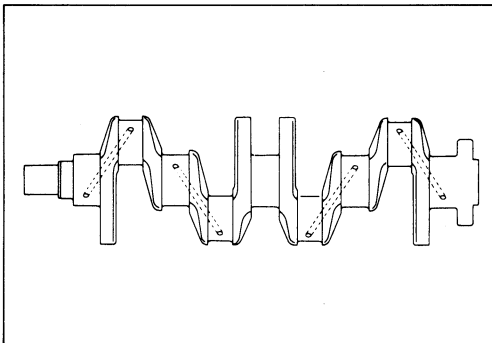
P : Oversize piston diameter : mm (in.)

C : Piston clearance : 0.045 - 0.065mm
(0.0018-0.0026 in.)

H : Allowance for honing : 0.03mm (0.0012 in.)
or less

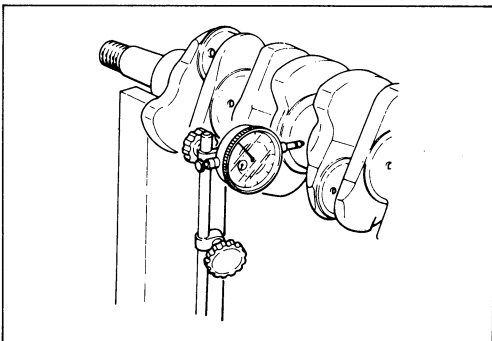
	mm(in.)
	G200Z
Grading position	40(1.575)
STD Piston	87.000-87.040(3.425-3.426)
O/S Piston 0.50	87.500-87.520(3.444-3.445)
O/S Piston 1.00	88.000-88.020(3.464-3.465)
Allowance for honing	0.01-0.03(0.004-0.0012)
Variance in bore diameters	0.02(0.0008) or less

CRANKSHAFT



Visual check

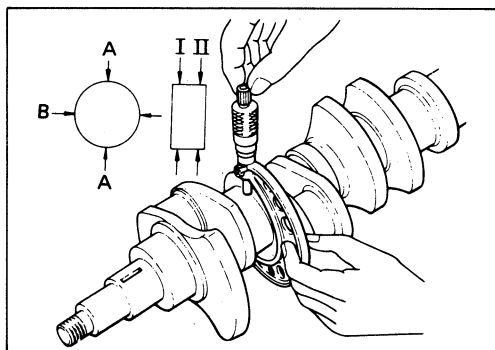
Check the faces of the crankshaft journals, crankpins and oil seal fitting faces for wear and damage, and the oil ports for obstructions.



Run out

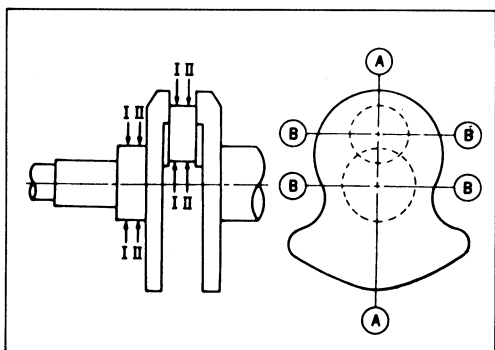
Check for run-out by turning the crankshaft slowly with the probe of a dial indicator set against the No. 3 journal.

	mm(in.)
Standard	Limit
0.03(0.0012) or less	0.1 (0.0038)

**Crankshaft journals and pins**

Measure the diameters of the crankshaft journals and crankpins at the front and rear (I and II) in directions of A and B, to determine the amount of wear and taper.

diameter		mm(in.)
	Standard	Limit
Journal	55.920—55.935 (2.2016—2.2022)	55.420 (2.1819)
Pin	48.925—48.940 (1.9262—1.9268)	48.425 (1.9065)



Taper		mm(in.)
		Limit
Journal		0.05 (0.002)
Pin		

CRANKSHAFT AND CRANKPIN BEARINGS

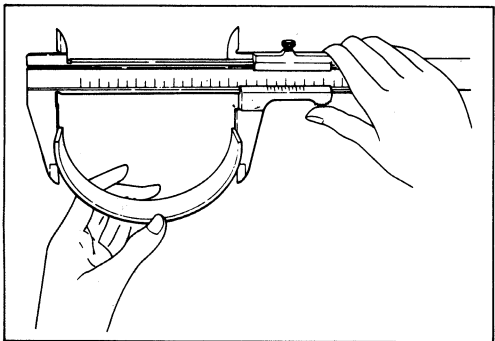
mm(in.)

Bearing Size	Journal Diameter	Pin Diameter
U/S 0.25	55.670—55.685 (2.1917—2.1923)	48.675—48.690 (1.9163—1.9109)
U/S 0.50	55.420—55.435 (2.1819—2.1825)	48.425—48.440 (1.9005—1.9071)

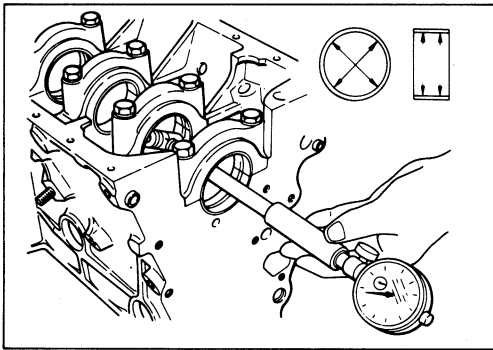
If the amount of wear is beyond the value specified, correct with a crankshaft grinder and install undersize bearings.

CRANKSHAFT BEARING**Visual check**

Check the inner face of the bearings for pin holes, disintegration, scores, etc. and replace all found to be defective.

**Bearing tension free width**

	mm(in.)
	Limit
Crankshaft bearing	More than 59.25 (2.33)
Connecting-rod bearing	More than 52.25 (2.06)



Measurement of the inside diameter of the journal-bearings

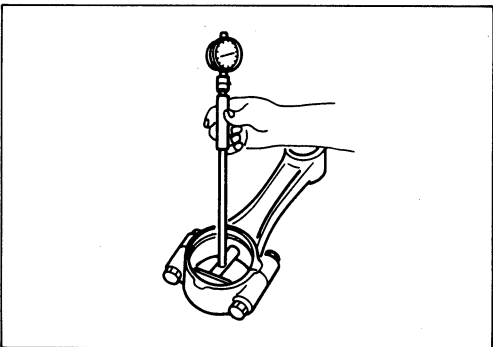
Install the bearing halves on the body and the bearing cap, respectively, then install the bearing cap on the cylinder body.

Torque	kg-m(ft.lbs.)	9.0 — 11.0 (65.1 — 79.6)
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Clearance between journals and bearings:

mm(in.)	
Standard	Limit
0.021 — 0.064 (0.008 — 0.0025)	0.12 (0.0046)



Measurement of the inside diameter of the connecting rod-bearings

Install the bearing on the connecting-rod big-end, then install the connecting-rod cap.

Torque	kg-m(ft.lbs.)	5.8 — 6.2 (42.0 — 45.0)
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Clearance between pins and bearings:

mm(in.)	
Standard	Limit
0.019 — 0.075 (0.0007 — 0.0029)	0.12 (0.0046)



- Note:**
1. When grinding crankshaft journals and crankpins, fillet portions of journals must be finished to maintain a radius of curvature of 2.3 mm (0.091 in.) and 2 mm (0.078 in.) for crankpins.
 2. Surface coarseness and out of round crankshaft journals and crankpins must be less than 0.001 mm (0.00004 in.) and 0.007 mm (0.00028 in.), respectively.



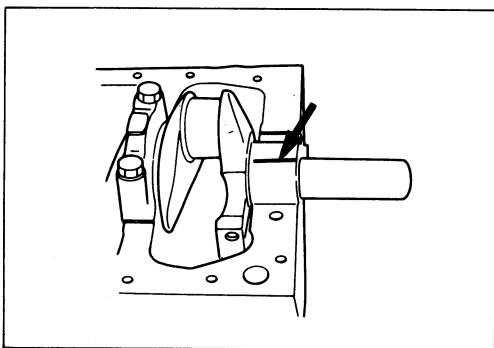
Measurement of clearance with plastigage

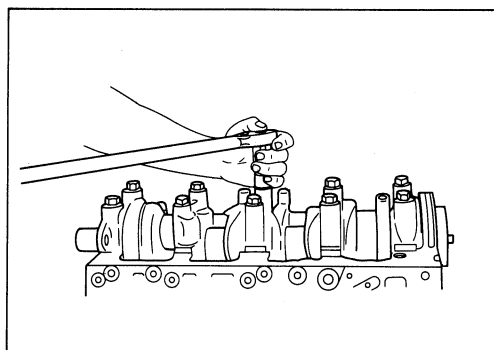


Crankshaft journals

Clean the journal, cap and bearing.

Position a plastigage (Arrow mark) over the crankshaft journal along the full width of the bearing.





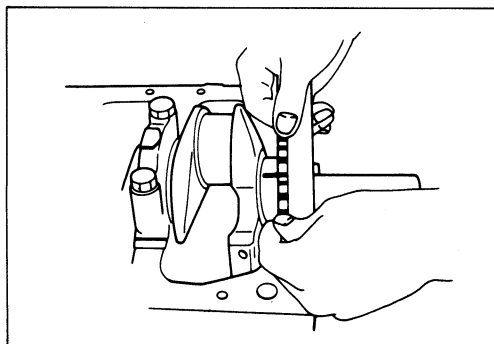
Attach the bearing to the bearing cap, then install the bearing cap.



Torque	kg-m(ft.lbs.)	9.0 — 11.0 (65.1 — 79.6)
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Do not turn the crankshaft.



Check the width of plastigage stuck to either the crankshaft or the bearing against the scale printed on the container of the plastigage.



Crankpins

Clean the pin, connecting-rod, cap and bearing. Position a plastigage over the crankshaft pin along the full width of the bearing.

Attach the bearing to the connecting-rod bearing cap, then attach the connecting-rod bearing cap.



Torque	kg-m(ft.lbs.)	9.0 — 11.0 (65.1 — 79.6)
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Do not turn the crankshaft.



Check the width of plastigage stuck to either crankshaft or bearing against the scale printed on the container of the plastigage.

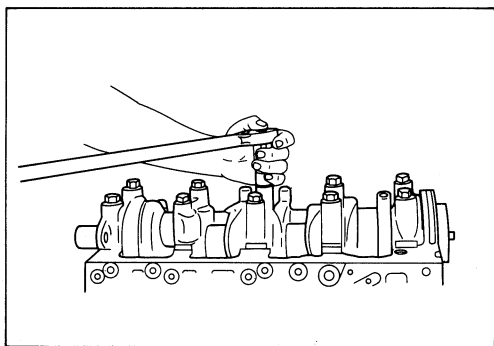


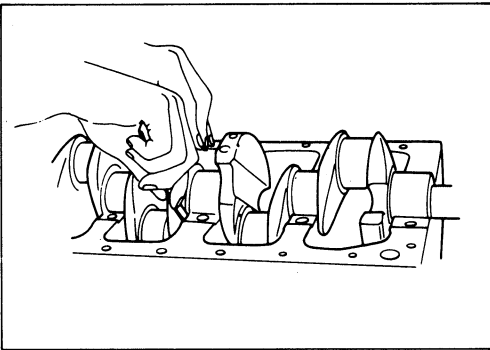
Crankshaft end play

Measure the end play at the thrust bearing installed on bearing cap No. 3 using a feeler gauge or dial indicator.



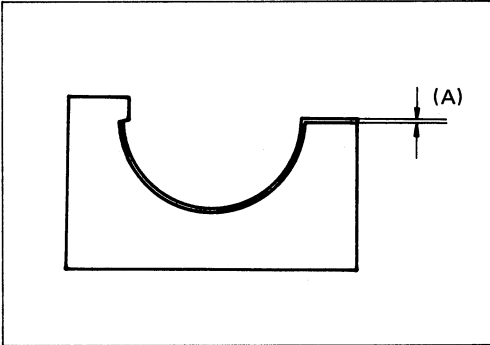
Torque	kg-m(ft.lbs.)	9.0 — 11.0 (65.1 — 79.6)
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mm(in.)	
Standard	Limit
0.06 — 0.24 (0.0024 — 0.0094)	0.3 (0.0117)

If end play is beyond limits, replace the thrust bearing.

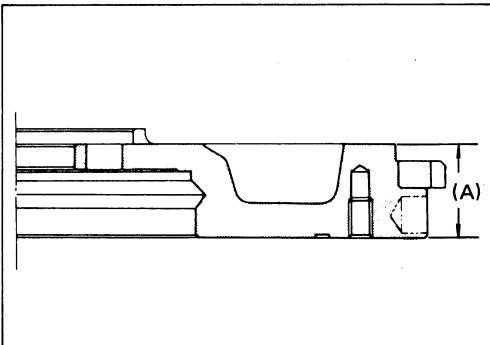


Measurement of bearing crush

Install the main bearing and the connecting rod bearing. Measure the bearing crush when the rear face of the bearing is fully seated.

Bearing crush (A) mm(in.)	0 — 0.04 (0 — 0.0016)
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FLYWHEEL AND RING GEAR



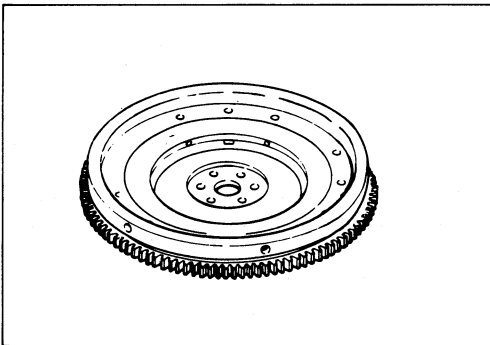
visual check

Check the friction face of the flywheel for cracks and damage and correct or replace as necessary.

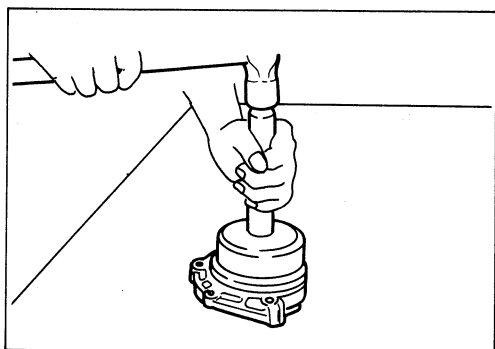


Depth (A) of the friction face

mm(in.)	
Standard	Limit
32 (1.26)	31 (1.22)



Replace the flywheel ring gear if the teeth are found to be damaged or worn excessively.



Install the parts properly using a setting tool.



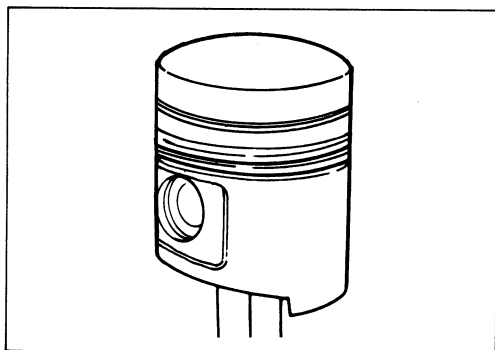
Setting tool : J-22928-A



Note: Fill the cavity in the oil seal with bearing grease and apply engine oil to the outer face of the oil seal.

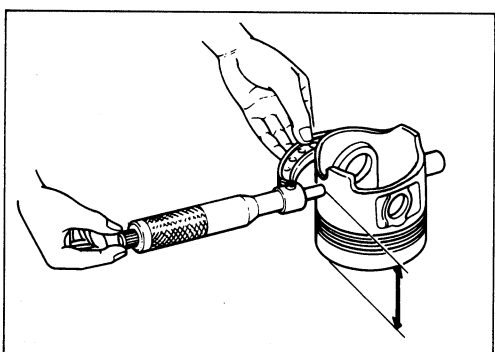


PISTON AND PISTON RING



Visual check

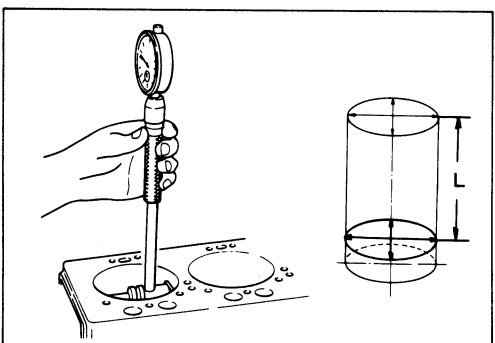
Inspect the pistons for wear, damage or other abnormal conditions.



Piston outside diameter

Take the measurement at a right angle to the piston pin hole.

Grading position : 40 mm (1.575 in.)

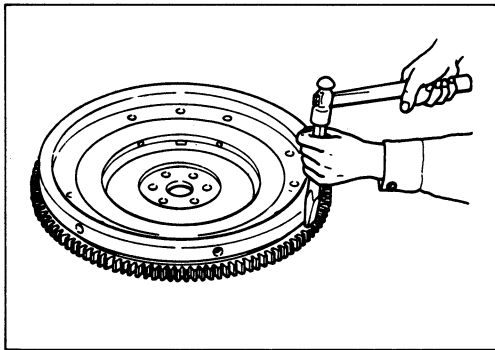


Piston clearance

Measure the inside diameter of the cylinder bore at the skirt, where the amount of wear is the least.

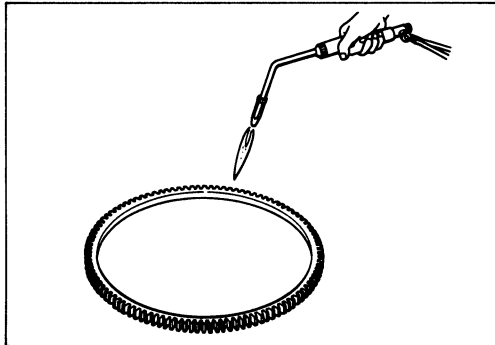
Measuring point (L)	mm(in.)	Approx. 120 (4.72)
Clearance	mm(in.)	0.045 — 0.065 (0.0018 — 0.0026)

Take the measurement in line with and at a right angle to the crankshaft. Compare the measured values to determine the clearance.

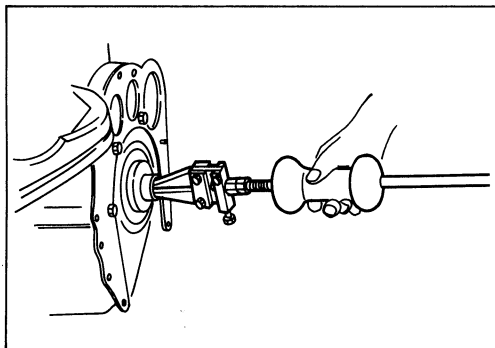


Ring gear replacement

Remove the ring gear from the flywheel by tapping around the side face of the gear with a hammer and a brass bar.



Heat the ring gear evenly with a gas burner [Max temperature 200°C (420°F)] to invite volumetric expansion. Install the ring gear on the flywheel when it is sufficiently heated.



Crankshaft pilot bearing and sleeve

Visual check

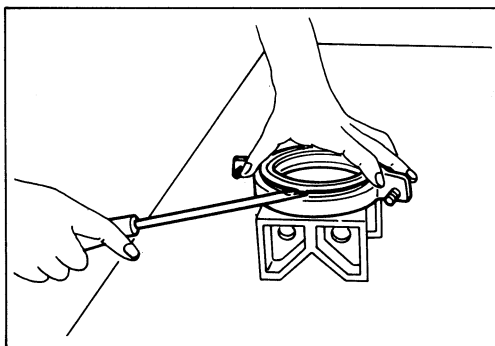
Check the pilot bearing for wear or damage and replace with a new one if any abnormal condition is noticeable.



Remover pilot bearing : J-23097

Installer pilot bearing : J-26516-A

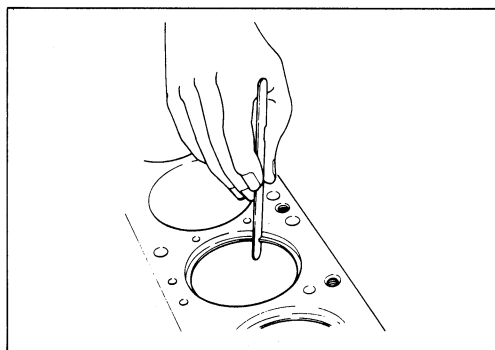
For removal and installation procedures, refer to "Clutch".



Rear oil seal replacement

These parts must be replaced at engine overhaul.
Remove the rear oil seal using a screw driver.

(Pry off the oil seal using a screw driver or equivalent).

**Piston size**

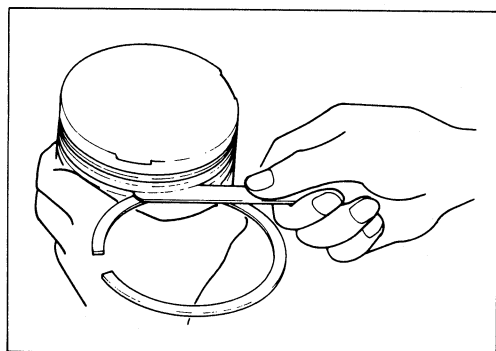
Refer to cylinder reboring procedure under the title of cylinder body.

Piston rings

Insert the piston ring into the bore and push it in, at a right angle to the wall, deep enough to reach the point where the cylinder bore diameter is the smallest, then measure the ring gap.

Piston ring gap mm(in.)

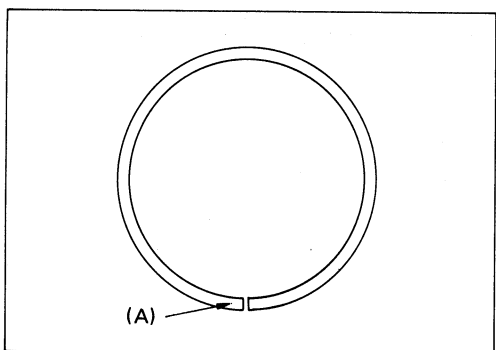
	Standard	Limit
1st. Compression ring	0.35 — 0.5 (0.014 — 0.019)	1.5 (0.059)
2nd Compression ring	0.35 — 0.5 (0.014 — 0.020)	1.5 (0.059)
Oil control ring	0.2 — 0.9 (0.008 — 0.035)	1.5 (0.059)



Clearance between the piston ring and the groove:

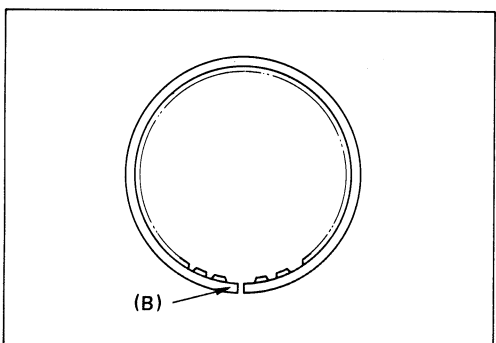
mm(in.)

	Standard	Limit
1st compression ring	0.025 — 0.060 (0.001 — 0.0024)	0.15 (0.006)
2nd compression ring	0.025 — 0.06 (0.001 — 0.0024)	0.15 (0.006)
Oil ring	0.02 (0.0008)	0.15 (0.006)

**Piston ring size mark**

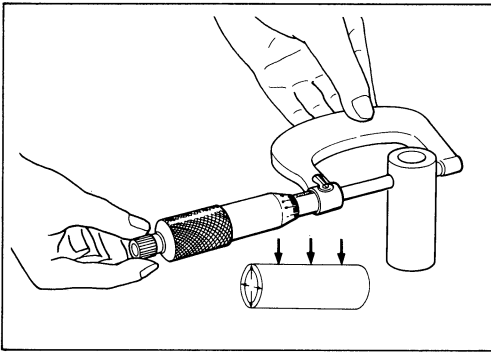
	STD	O/S 0.50	O/S 1.00
1st. Comp. ring	None	50	100
2nd. Comp. ring	None	100	100

Size mark on the Portion (A)



	STD	O/S 0.50	O/S 1.00
Oil ring	Red	Blue	Yellow

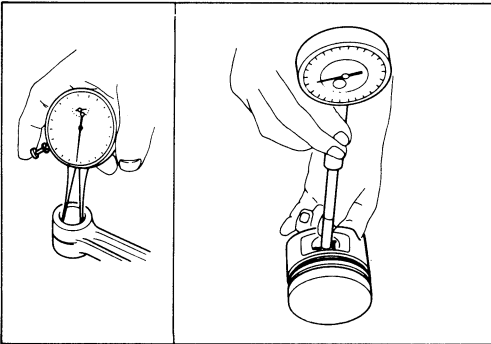
Color painted = Portion (B)

**Piston pin outside diameter**

mm(in.)

Standard	Limit
22.0 (0.866)	21.970 (0.865)

Measure the diameter at several points around the circumference.

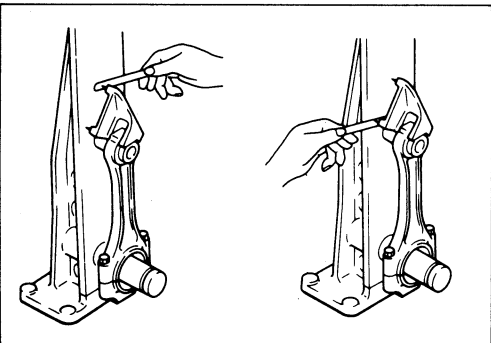
**Fitting interference between the small end and the piston pin.**

Standard	mm(in.)	0.030 — 0.041 (0.0008 — 0.0016)
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**Clearance between the piston pin and the piston hole.**

mm(in.)

Standard	Limit
0.006 — 0.011 (0.00023 — 0.00043)	0.040 (0.0016)

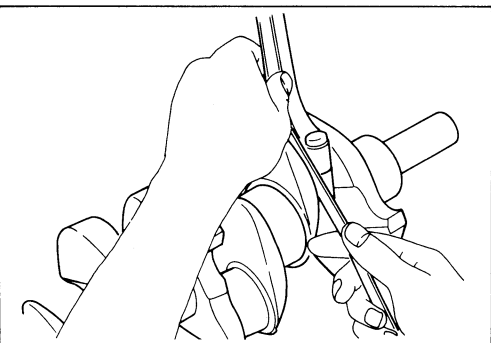
CONNECTING ROD**Distortion and parallelism**

Check across the centers of the small-end and the big-end for distortion and parallelism.

mm(in.)

	Standard	Limit
Distortion	0.05 (0.002) or less	0.2 (0.0078)
Parallelism	0.05 (0.002) or less	0.15 (0.0058)

(Par length of 100 mm (3.94 in)).

**Connecting rod clearance****1. Clearance between the big end and the crankshaft**

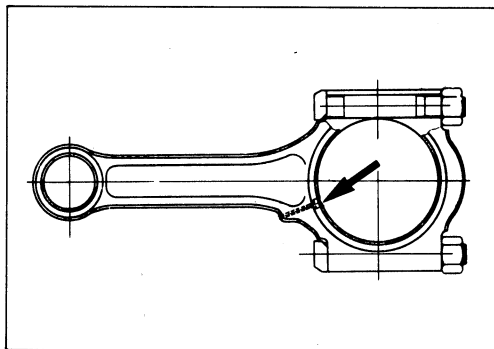
Attach the connecting rod to the crankshaft and measure the clearance between the connecting rod big-end and the side face of the crankpin using a feeler gauge.

mm(in.)

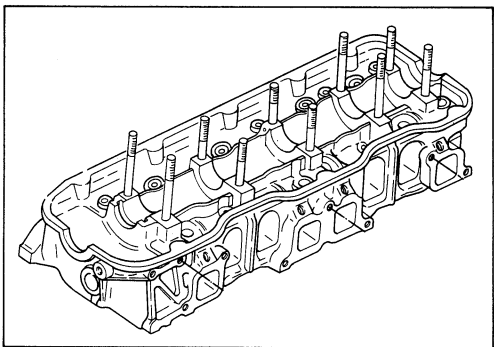
Standard	Limit
0.020 — 0.33 (0.0078 — 0.013)	0.35 (0.014)

**2. Clearance between the small end and the bushing**

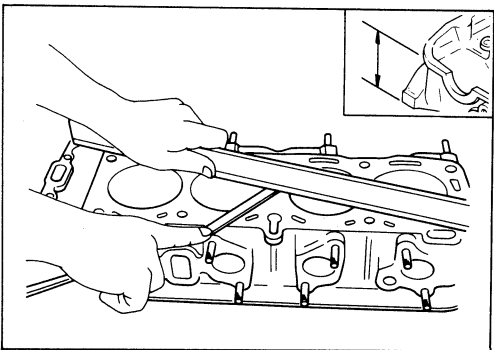
Install the piston and check the clearance using a feeler gauge.

**Oil jet**

Check the oil jet (arrow mark) on each connecting rod for obstructions and clean as necessary.

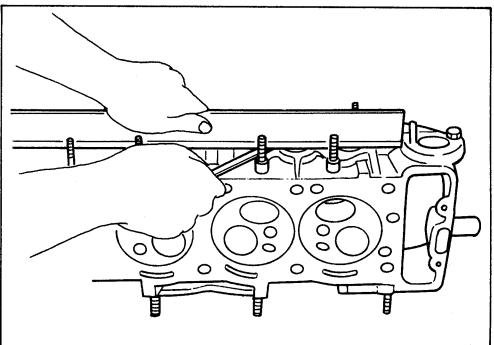
CYLINDER HEAD**Visual check**

Inspect the cylinder head for wear, damage, or other abnormal conditions.

**Distortion of lower face**

Check the lower face for distortion in directions diagonally and across the face as shown, using a straight edge and a feeler gauge.

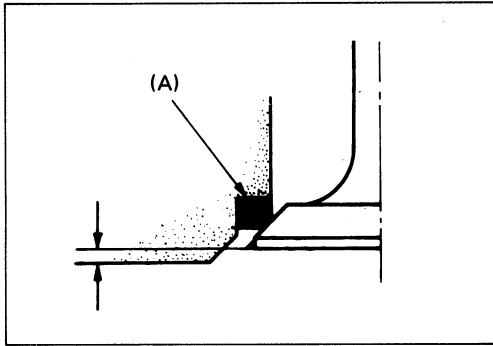
mm(in.)			
Standard	Limit	Max. Usable limit	Standard head height
0.05 (0.002) or less	0.2 (0.0078)	0.4 (0.0157)	93.2 (36.7)

**Distortion of manifold fitting faces**

Check the intake and exhaust manifold fitting faces of the cylinder head for distortion with a straight edge and a feeler gauge.

mm(in.)	
Standard	Limit
0.05 (0.002) or less	0.4 (0.0157)

VALVE SEAT

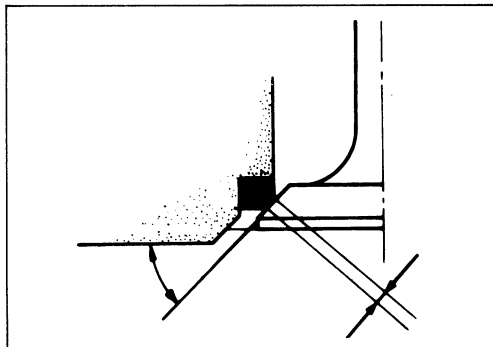


Valve seat inserts

Install the valve in the cylinder head and check the amount of depression from the cylinder head face using a depth gauge or a straight edge and a scale. If the measured value is beyond the value specified, replace the valve seat insert.

Depression mm(in.)	
Standard	Limit
1.0 (0.089)	1.7 (0.0669)

(A) Portion : Valve seat insert

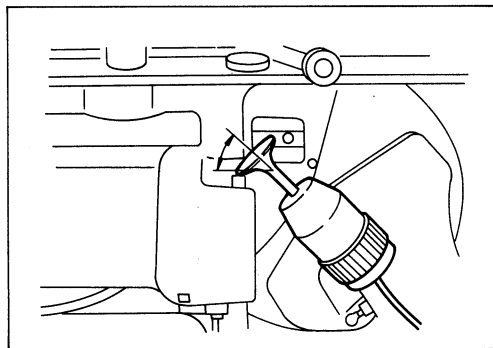


Contact width

Check the valve seat for poor contact dents or damage. Correct the valve seat if the width of contact is beyond the value specified.

mm(in.)	
Standard	Limit
1.2 — 1.6 (0.048 — 0.063)	2.0 (0.078)

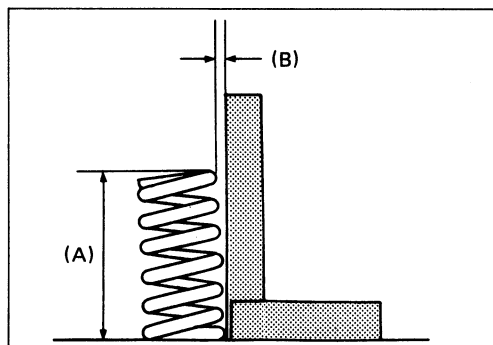
Valve angle : $\theta = 45^\circ$



Correction of valve seat

Grind the seating face of the valve head to an angle of 45 degrees using a valve grinder. Grind the valve stem end as necessary.

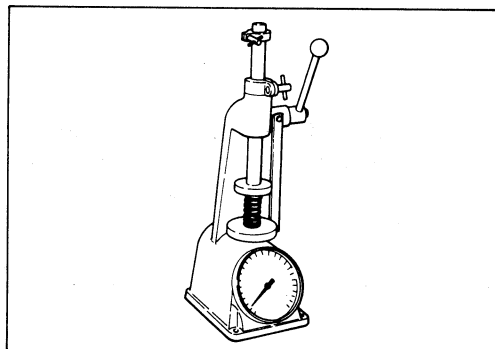
VALVE SPRING



Visual check

Inspect the valve springs for damage or other abnormal conditions.

mm(in.)		
	Standard	Limit
Free length (A)	48.1 (1.893)	45.4 (1.787)
Inclination (B)	0	2.0 (0.079)



Tension (When compressed to the specified length)

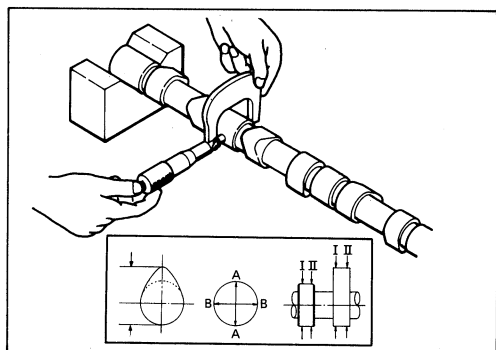
		Standard
Compressed length at 41 mm (1.60 in.)	kg (lb.)	25.1 (55.35)

CAMSHAFT



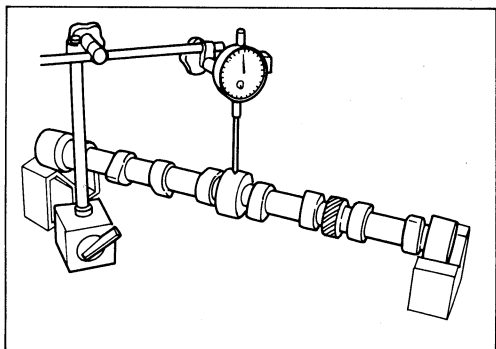
Visual check

Inspect all disassembled parts for wear, damage, or other abnormal conditions.



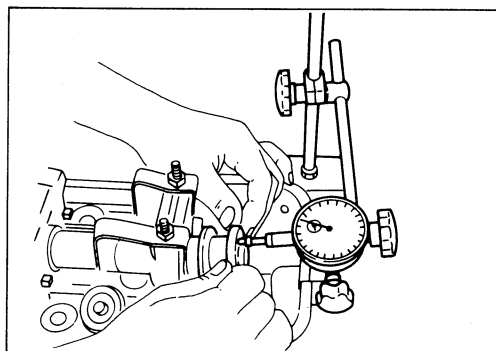
Journal diameter

mm(in.)		
	Standard	Limit
Journal diameter	34.0 (1.339)	33.8 (1.331)
Height of camlobe	36.85 (1.451)	36.25 (1.431)
Taper	0.015 (0.006) or less	0.05 (0.002)



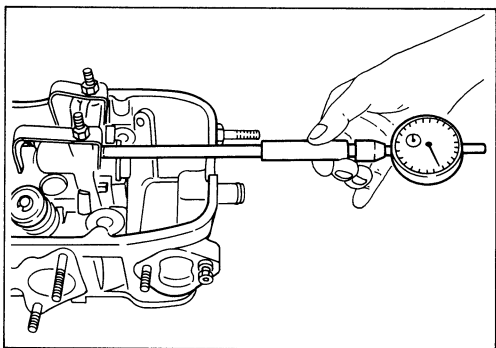
Run-out

mm(in.)	
Standard	Limit
0.05 (0.002) or less	0.1 (0.004)

**End play**

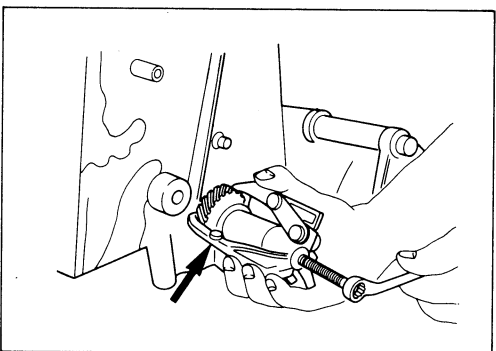
Attach the camshaft and the rocker arm shaft brackets to the cylinder head.

Torque	kg-m(ft.lbs)	2.1 — 2.3 (15.2 — 16.6)
mm(in.)		
	Standard	Limit
End play	0.05 — 0.150 (0.002 — 0.006)	0.2 (0.0078)

**Clearance between the journal and the bearing**

Attach the rocker arm shaft brackets to the cylinder head.

Torque	kg-m(ft.lbs)	1.95 — 2.45 (14.10 — 17.72)
mm(in.)		
	Standard	Limit
Clearance	0.065 — 0.110 (0.003 — 0.0043)	0.15 (0.006)

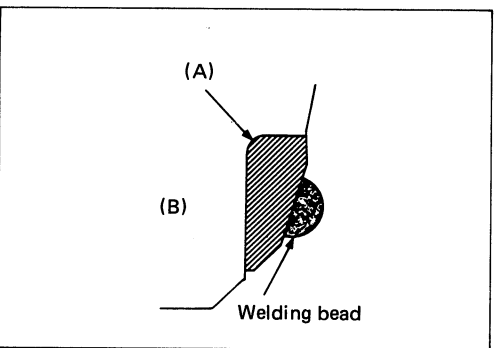
**TIMING WHEEL****Visual check**

Inspect the crankshaft timing wheel for wear, damage, or other abnormal conditions.

Use a special tool if the camshaft timing gear does not come off smoothly.



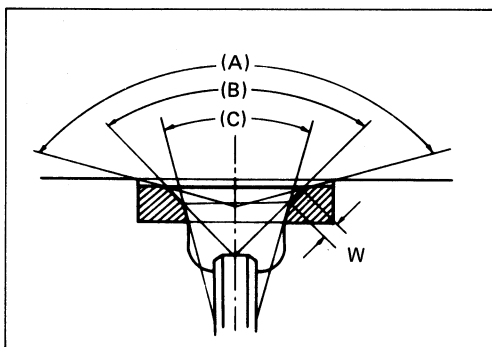
Remover : J-25031

**Valve seat insert replacement (reference).**

1. Weld the end of the welding rod to the inner face of valve insert (A) several portions away from the aluminum alloy parts.
2. Allow cylinder head (B) to cool off for 2 to 5 minutes, so that contraction of the insert takes place. Apply a shock load to the welding rod and pull out the insert.
3. Clean the valve seat insert bore carefully. Using hot steam, heat the valve seat insert bore until thermal expansion is apparent. At the same time, cool the valve seat insert with dry ice or some other material to cause volumetric contraction.

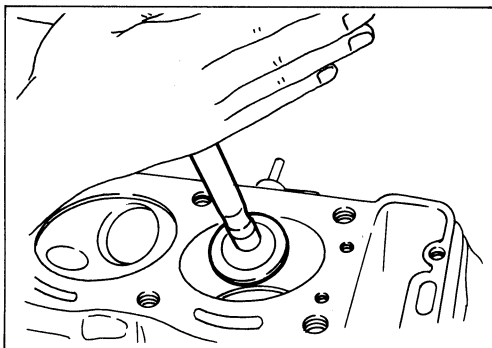
Press the cooled valve seat insert into the heated valve seat insert bore smoothly and evenly.

Standard fitting interference	mm(in.)	0.08 — 0.12 (0.0031 — 0.0047)
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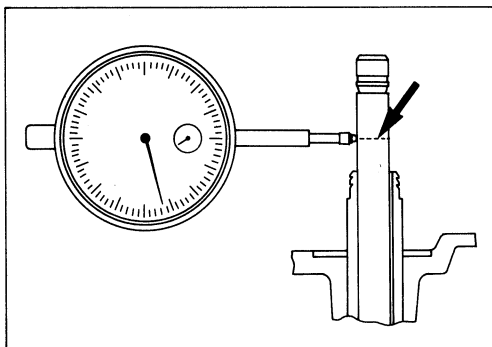
Correction of valve seat

Use 150(A), 90(B), and 30°(C) seat cutters to remove carbon from the valve seat and the cut seating face. Remove as little material as possible, but enough to eliminate any scoring or roughness and assure proper contact.



Apply lapping compound to the valve seat face and lap the valve and seat. Continue valve lapping operation until standard contact width and the uniform contact are obtained.

VALVE GUIDE



Clearance between the valve stem and the valve guide

mm(in.)

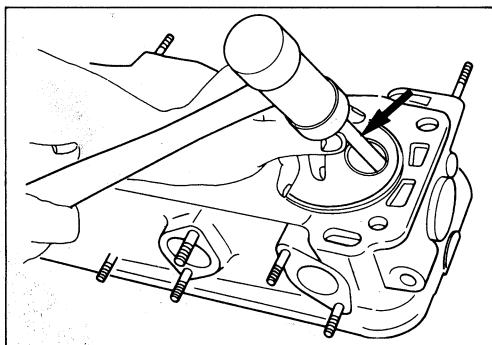
	Standard	Limit
Intake	0.023 — 0.056 (0.0009 — 0.0022)	0.2 (0.0079) or more
Exhaust	0.038 — 0.070 (0.0015 — 0.0031)	0.25 (0.0097) or more

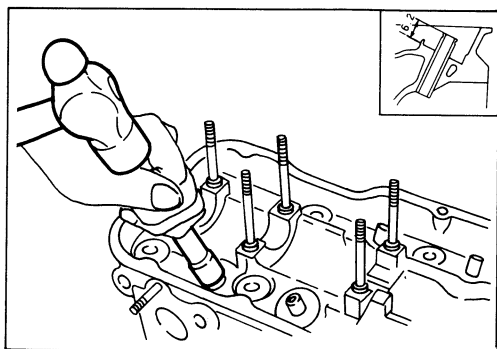
Valve guide replacement (Reference)

Removal

Fit the remover against the valve guide and drive the valve guide out from the lower face of the cylinder head.

Remover : J-26512-1



**Installation**

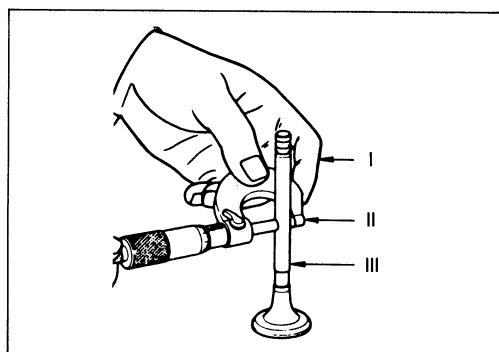
Apply engine oil to the outer circumference of the valve guide. Set the installer to the valve guide, and use a hammer to drive the guide into position from the upper face of the cylinder head.



mm(in.)		
Height of valve guide upper end from cylinder head upper face (H)	16.1 — 16.3 (0.634 — 0.642)	



Installer : J-26512
J-26512-1
J-26512-2

VALVE**Valve stem**

Replace the valve with a new one when the valve stem diameter is less than the valve specified or if heavy scores or valve sticking are noticeable.



mm(in.)		
	Standard	Limit
Intake	8.0 (0.315)	7.88 (0.3102)
Exhaust	8.0 (0.315)	7.85 (0.3091)

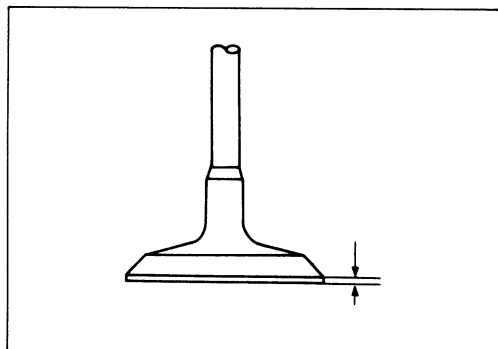


The valve should always be replaced together with the valve guide as a set.

**Valve seat thickness**

Replace the valve with a new one if the thickness is less than the valve specified.

mm(in.)		
	Standard	Limit
Intake	1.1 (0.0433)	0.8 (0.0315)
Exhaust	1.3 (0.0512)	1.0 (0.0394)

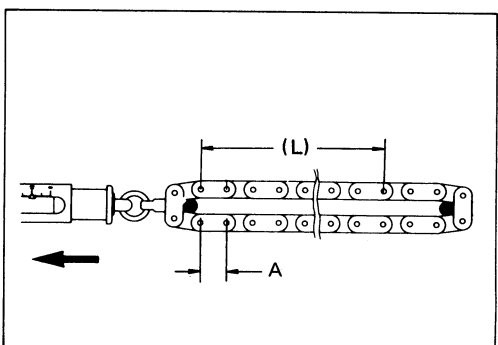
**TIMING TRAIN****Visual check**

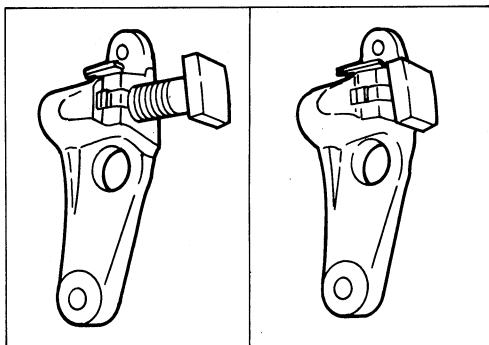
Inspect the timing chain for wear, damage, or other abnormal conditions.

**Timing chain**

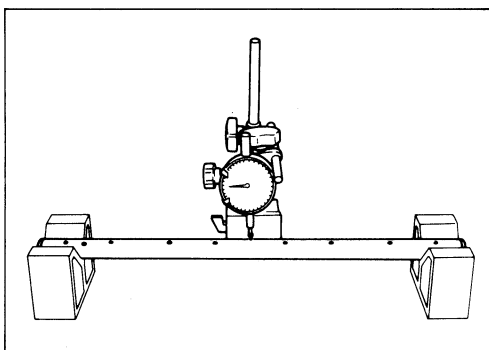
Measure the distance across the centers of the pins at any 2 points 40 links apart with the chain tensioned at 10 kgs (22 lbs.).

mm(in.)		
Centers of pins at ends of any 40 links (L) (A = 1 link)	Standard	Limit
	381 (14.50)	385 (15.16)



**Automatic adjuster**

1. Unlock the look lever, depress the shoe, and release the lever check that the adjuster is locked.
2. Check that the adjuster is unlocked when the shoe is depressed.

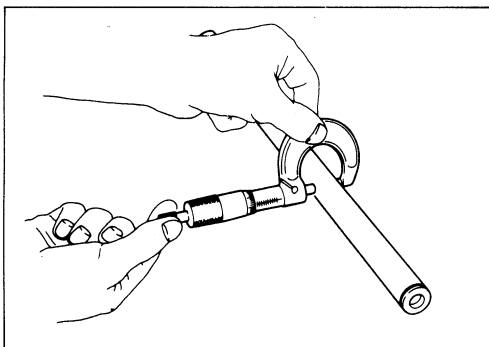
ROCKER ARM SHAFT AND ROCKER ARM**Visual check**

Inspect the rocker arm shaft and the rocker arms for wear, damage, or other abnormal conditions.

**Rocker arm shaft**

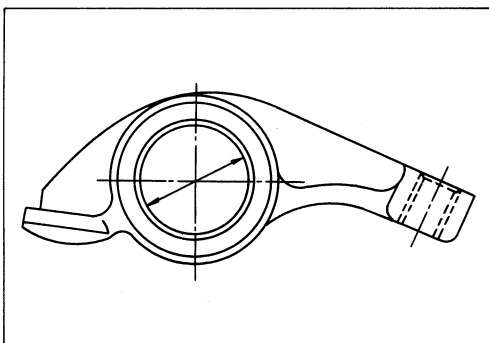
Run out

mm(in.)	
Standard	Limit
0.2 (0.008) or less	0.4 (0.016)

**Diameter**

Measure the outside diameter of the shaft at any 4 points in contact with the rocker arm.

mm(in.)	
Standard	Limit
20.5 (0.807)	20.35 (0.801)

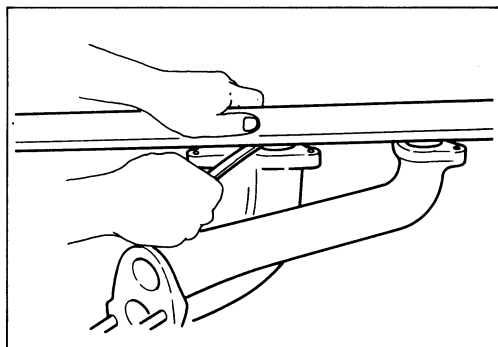
**Rocker arm**

Clearance between the rocker arm shaft and the rocker arm.

mm(in.)	
Standard	Limit
0.005 — 0.045 (0.002 — 0.0018)	0.2 (0.0078)



If excessive wear of the rocker arm shaft and the rocker arm is evident make the necessary replacements. Check the fitting face of the rocker arm and the valve stem end cap for step wear and scoring. Replace the rocker arms if necessary.

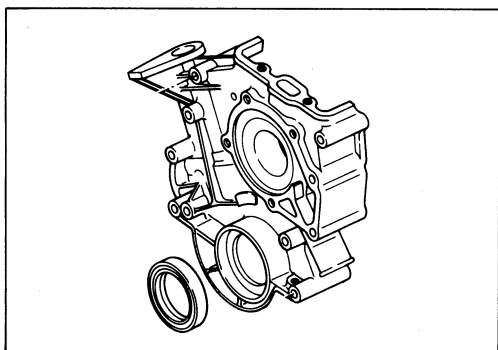
INTAKE AND EXHAUST MANIFOLD**Visual check**

Inspect both manifolds for cracks, damage or other abnormal conditions.

**Distortion of the cylinder head faces**

Check the intake and exhaust manifold fitting faces of the cylinder head for distortion using a straightedge and a feeler gauge.

mm(in.)	
Standard	Limit
0.05 (0.002)	0.4 (0.016)

FRONT COVER**Visual check**

Inspect the front cover for cracks, damage, or other abnormal conditions.

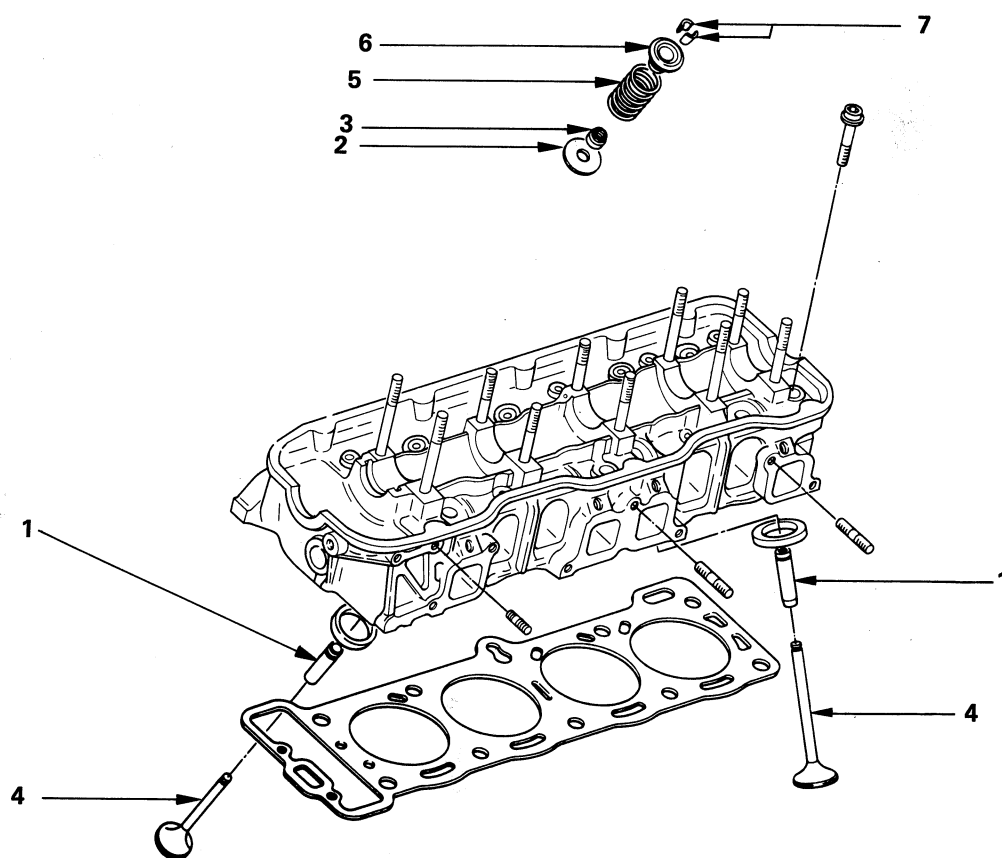


REASSEMBLY

INTERNAL PARTS

MINOR COMPONENTS

CYLINDER HEAD



Reassembly steps

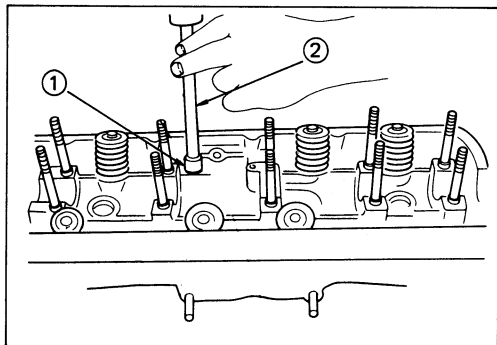
- | | |
|-----------------------------------|-------------------------|
| ▲ 1. Guide ; valve | ▲ 5. Valve spring |
| ▲ 2. Cap ; valve spring, lower | ▲ 6. Spring cap ; upper |
| ▲ 3. Oil controller ; valve guide | ▲ 7. Collar ; split |
| ▲ 4. Valve ; | |



Important operations



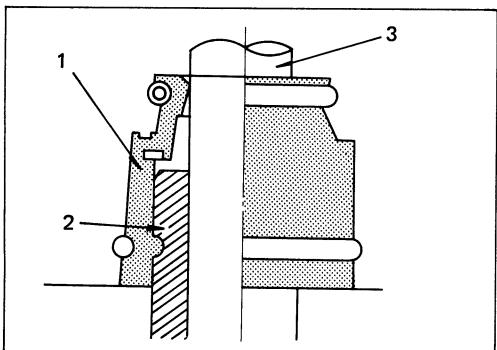
1. Valve guide
2. Cap ; valve spring, lower
3. Oil controller ; valve guide
4. Valve



1. Guide ; valve

Installer : J-26512

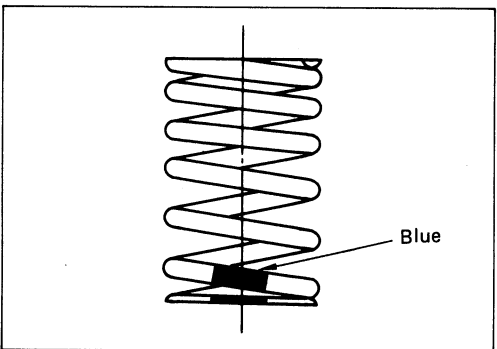
- 1 J-26512-1
- 2 J-26512-2



3. Oil controller ; valve guide

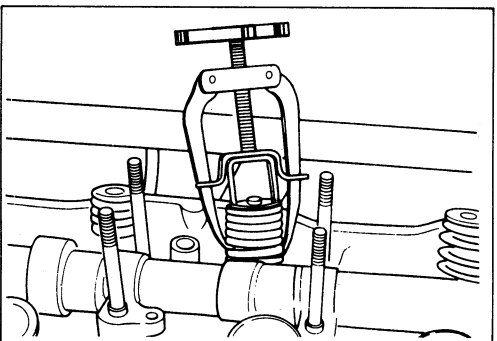
The projection on the inner face of the oil controller must be fitted properly into groove in the valve guide head.

- 1) Oil controller
- 2) Valve guide
- 3) Valve stem



5. Valve spring

The valve spring should be installed with the blue painted end turned down.

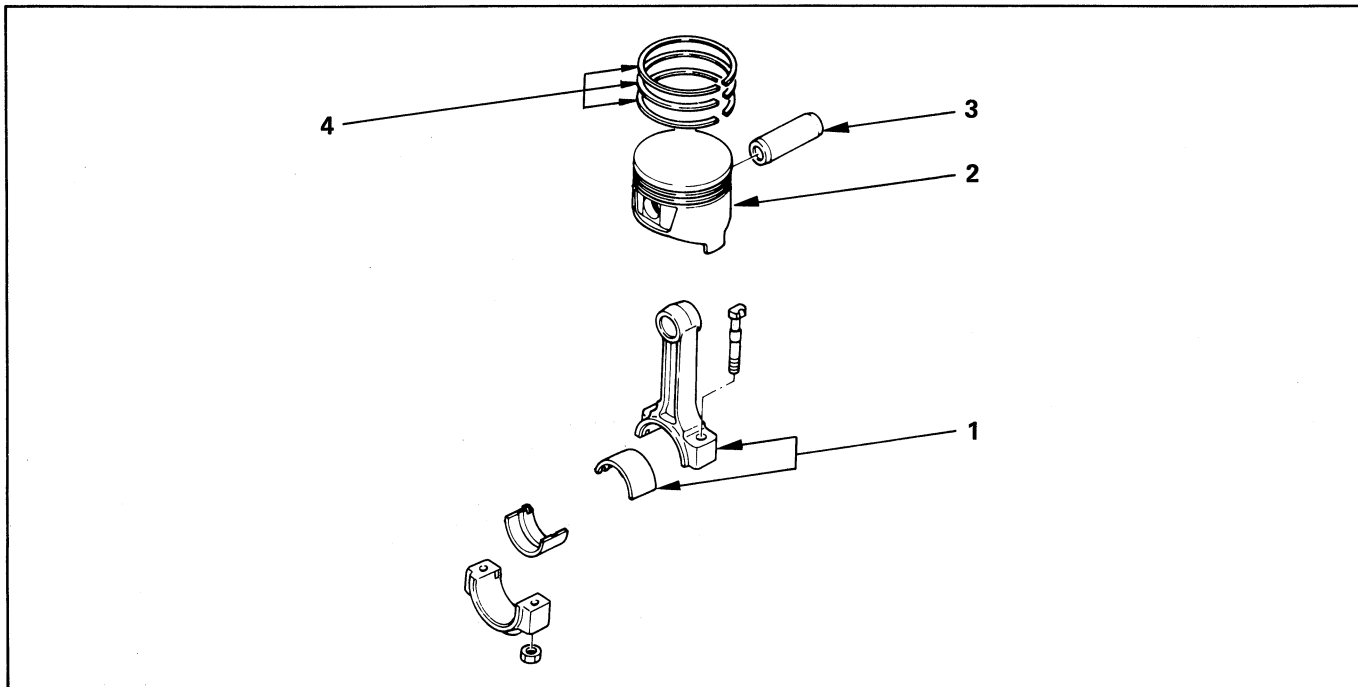


7. Coller ; split

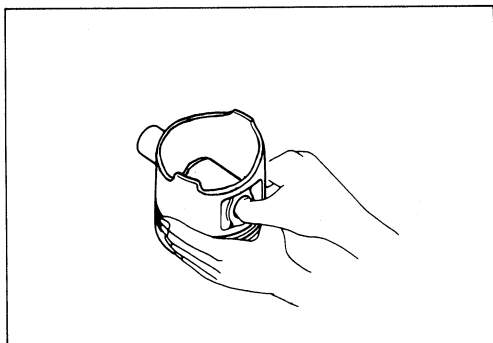
Compress the spring with the valve spring compressor and install the split key.

Valve spring compressor : J-26513-A

PISTON AND CONNECTING ROD

**Reassembly steps**

- ▲ 1. Connecting rod with bearing
- ▲ 2. Piston
- 3. Piston pin
- ▲ 4. Piston rings

**Important operations**

Apply a thin coat of engine oil to the piston pin and see if it can be fitted into the piston pin hole with finger pressure. If the resistance is excessive and the piston pin can not be press-fitted with finger pressure, select a piston pin of a smaller diameter.

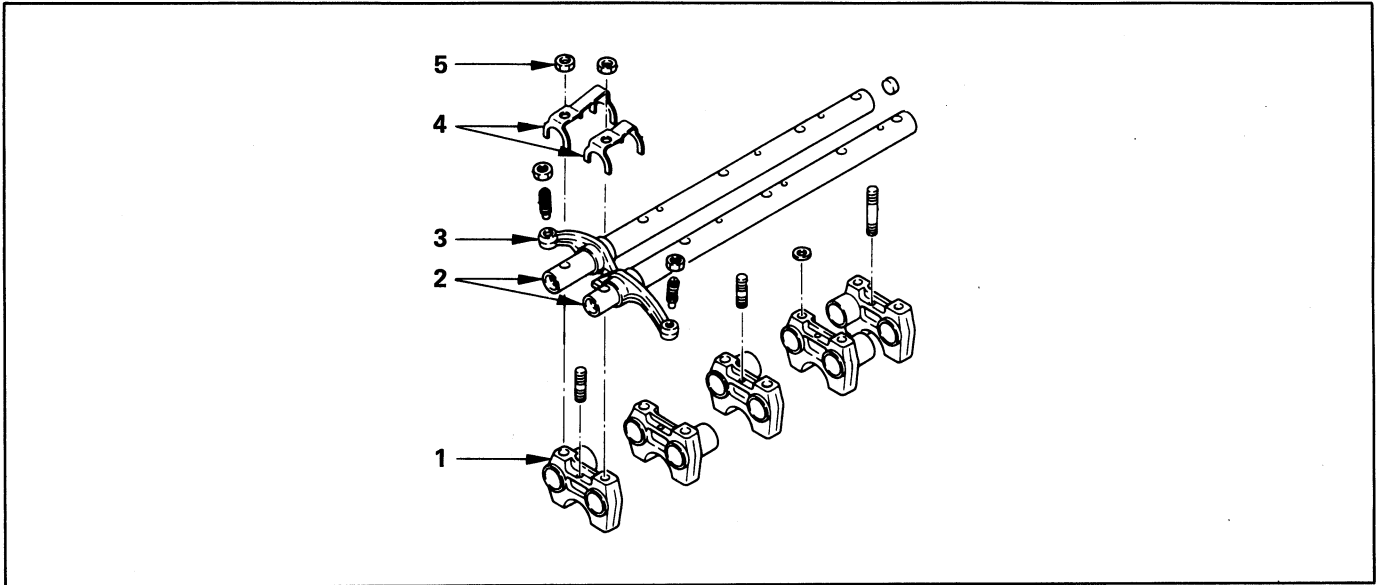


Measuring weight of the piston and connecting-rod assembly
Measure the weight of each piston and connecting-rod. Select the proper piston and connecting-rod combination, so that the variance in the weight of the piston and connecting-rod assemblies is held within the specified limits.



Variance in weight after assembly:	kg(oz)	Less than 0.012 (0.0004)
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ROCKER ARM AND SHAFT ASSEMBLY

**Reassembly steps**

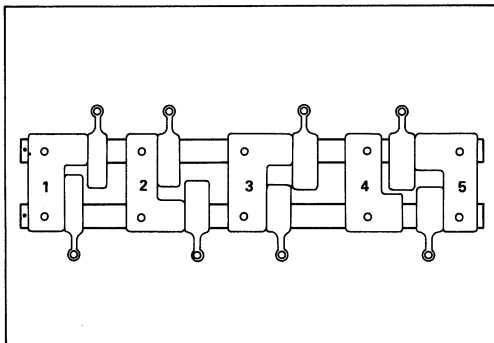
- ▲ 1. Bracket ; rocker shaft
- ▲ 2. Shaft ; rocker arm
- ▲ 3. Rocker arm
- ▲ 4. Spring ; rocker arm
- ▲ 5. Nut ; rocker arm bracket

**Important operations**

Apply engine oil to the rocker arms and rocker arm shafts.

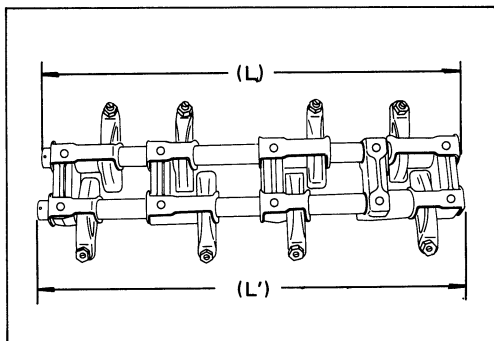
**1. Bracket ; rocker arm shaft**

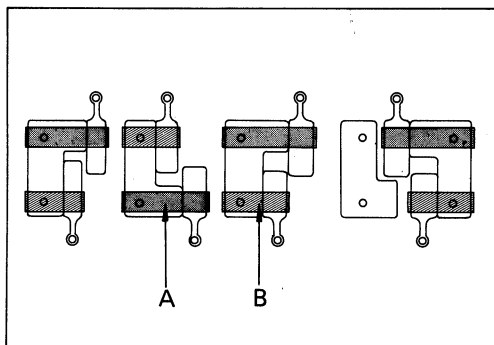
Install the rocker arms and shafts in numerical sequence, with the number on the brackets turned to the front.

**2. Shaft ; rocker arm**

Install longer shafts on the exhaust side and shorter ones on the intake side, with the punch mark turned to the front.

Intake side	$L = 388 \text{ mm (15.28 in.)}$
Exhaust side	$L' = 391 \text{ mm (15.40 in.)}$





3. Rocker arms

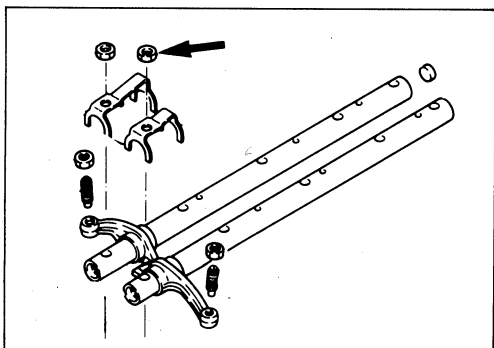
Position the rocker arms in sequence of the stamped numbers.

: Rocker spring "A"

: Rocker spring "B"

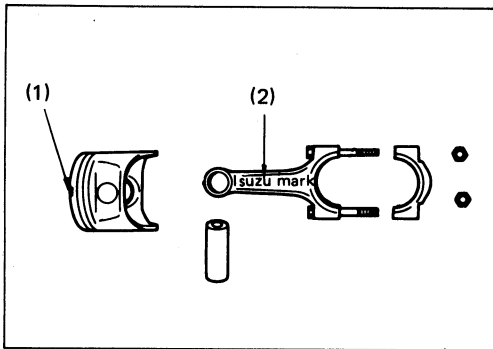
kg-m(ft.lbs.)

Nut ; adjust screw Torque	1.6-2.0 (11.6-14.5)
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5. Nut ; rocker arm bracket

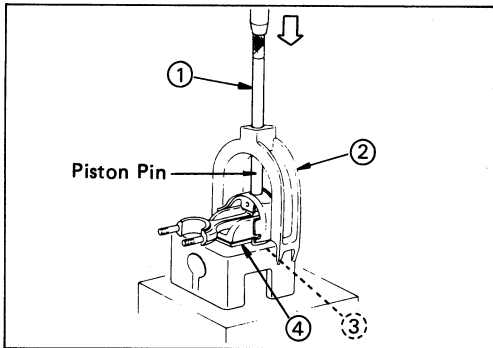
Torque	kg-m(ft.lbs.)	2.1 - 2.3 (15.2 - 16.6)
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1. Connecting-rod

2. Piston

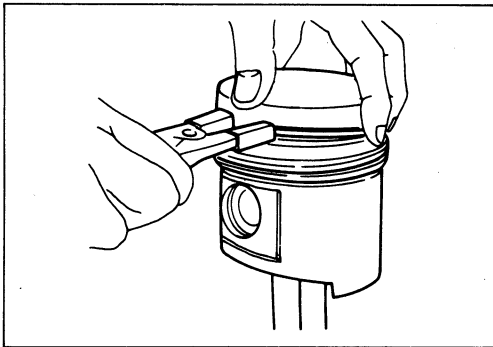
Attach the piston to the connecting-rod, so that front mark (1) on the piston and the Isuzu mark (2) on the connecting-rod are on the same side.



Remover and installer

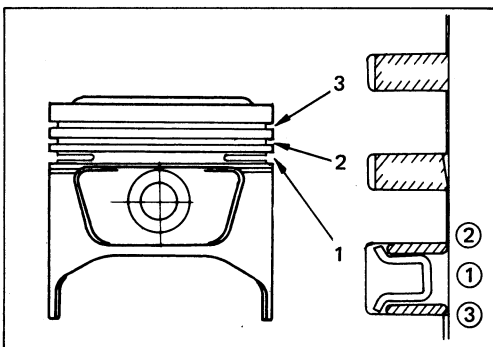
: J-24086

- | | |
|-------------------|--------------|
| 1. Installer | : J-24086-9 |
| 2. Base fixture | : J-24086-10 |
| 3. Pin guide | : J-24086-5 |
| 4. Piston support | : J-33948 |



4. Piston rings

Install the piston rings using piston ring installer or equivalent.

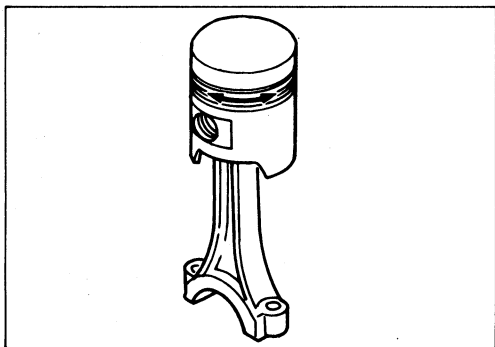


Install piston rings in the following sequence:

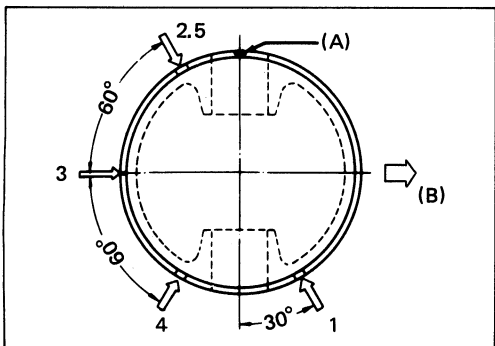
1. Oil ring
 - 1) Expander ring
 - 2) Upper side rail
 - 3) Lower side rail
2. No. 2 Compression ring
3. No. 1 Compression ring

Note: 1. Install compression ring with the "N" mark side up.
2. The side rail may be installed with either side up.

01—50 GASOLINE ENGINE



After installation, apply engine oil to the entire circumference of the rings and check that the rings rotate freely.

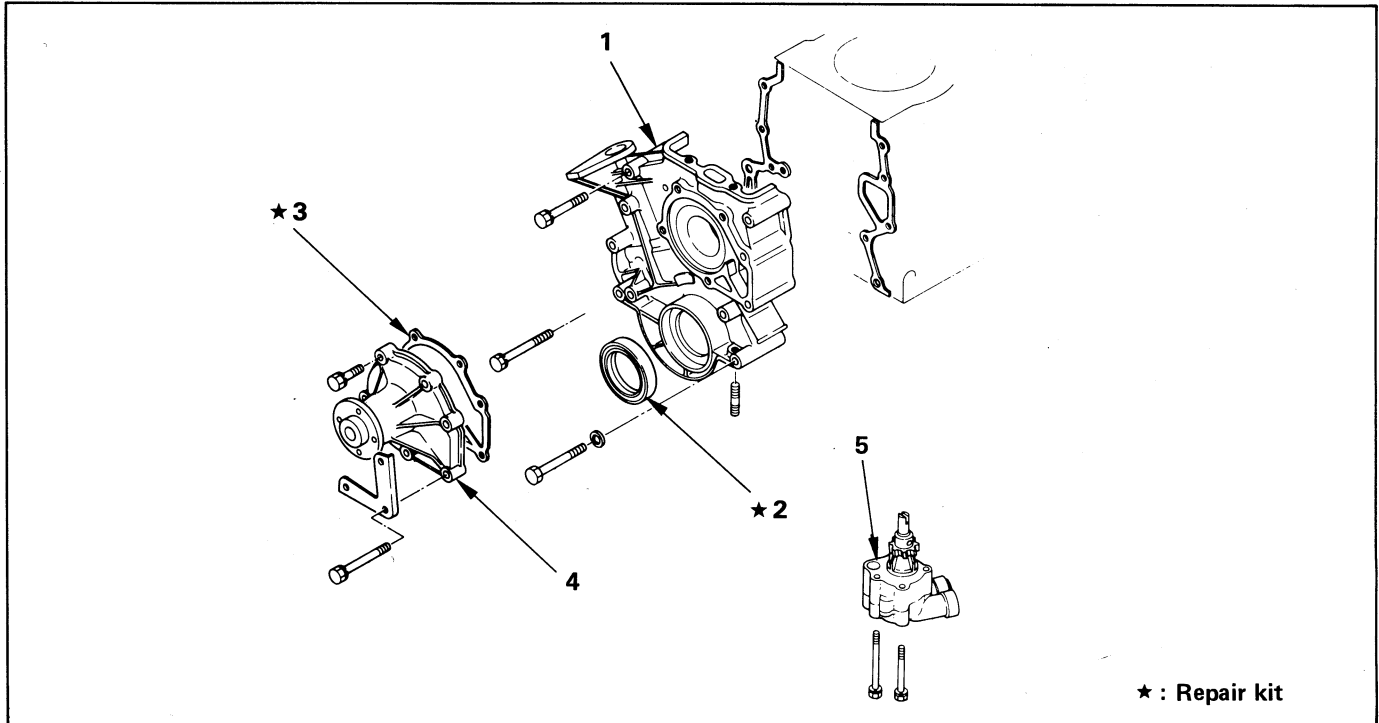


Position of the piston ring gaps

Piston ring gaps should be set in position as shown, away from the direction of the side thrust.

1. 1st, compression ring
2. 2nd, compression ring
3. Expander
4. Upper side rail
5. Lower side rail
- A Piston front mark
- B Direction of side thrust

FRONT COVER



Reassembly steps

- 1. Front cover
- ▲ 2. Oil seal
- 3. Gasket ; water pump
- ▲ 4. Water pump assembly
- 5. Oil pump assembly

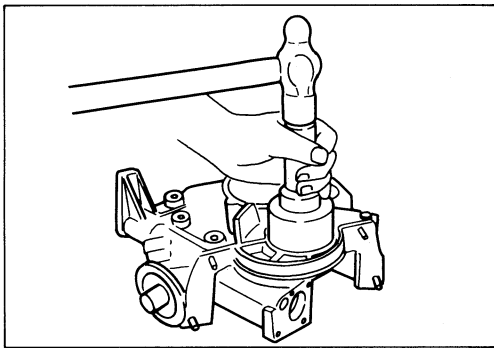


Important operations



2. Oil seal

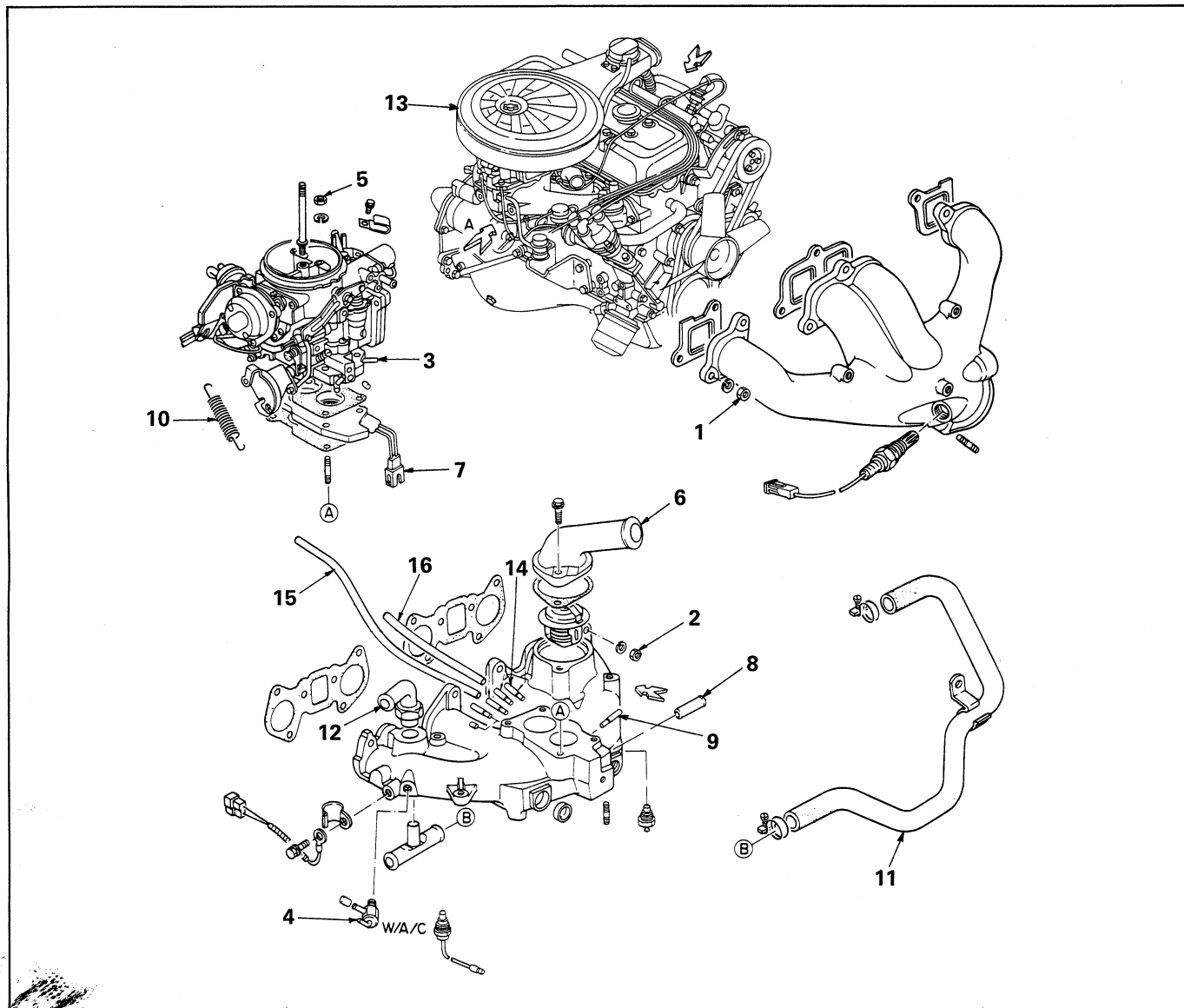
Installer : J-26587



4. Water pump assembly

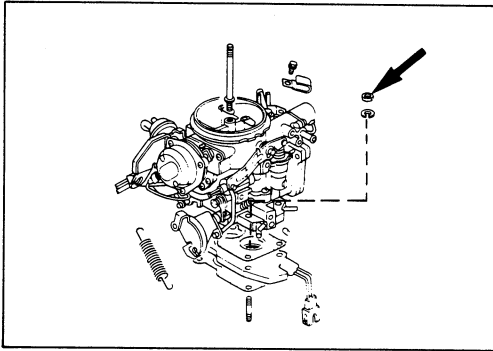
Torque	kg-m(ft.lbs.)	2.3 — 2.7 (16.6 — 19.5)
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INLET AND EXHAUST MANIFOLD



Reassembly steps

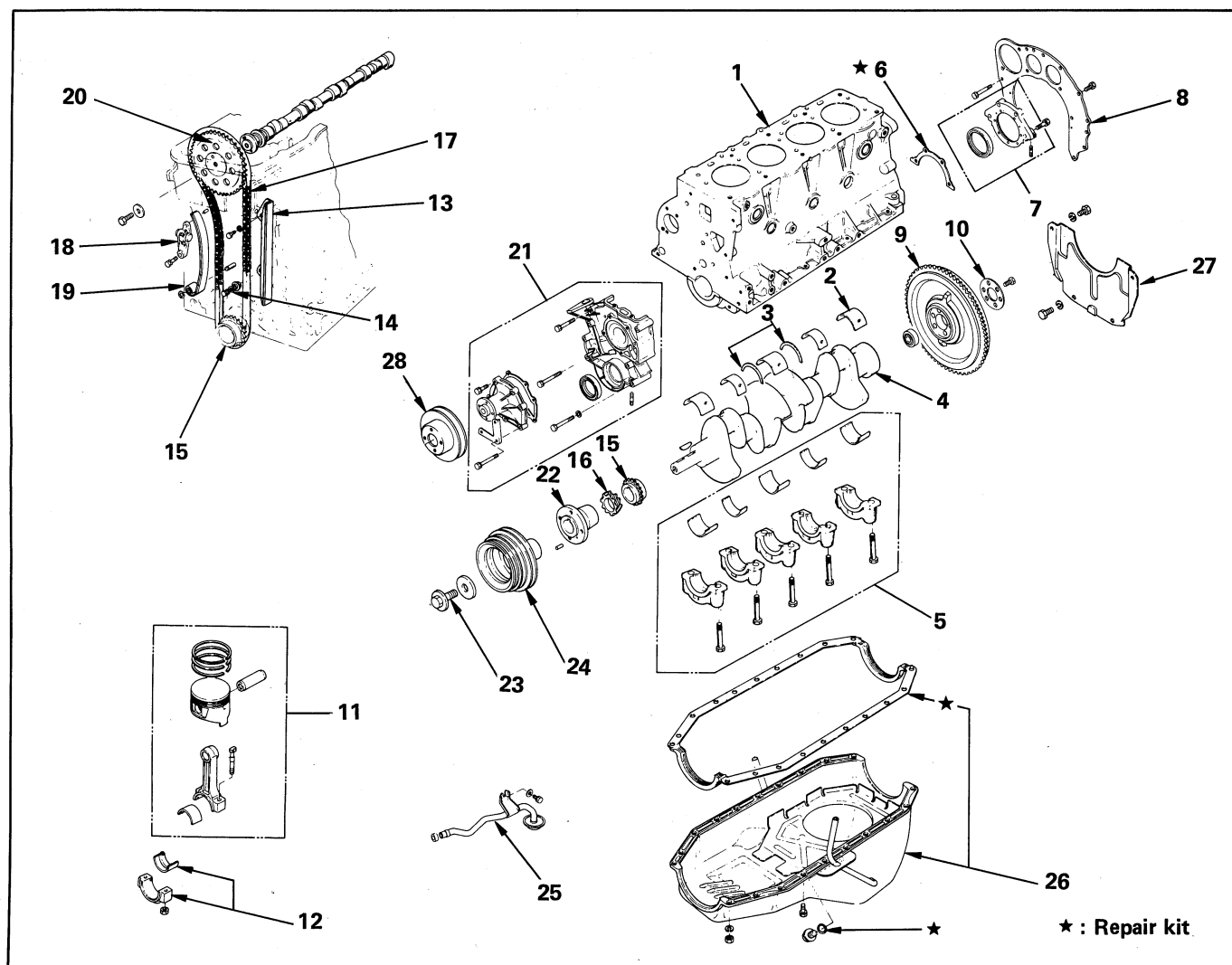
- | | |
|--------------------------------------|-------------------------------|
| 1. Attaching nuts ; exhaust manifold | 9. Pipe ; purge |
| 2. Attaching nuts ; inlet manifold | 10. Return spring ; throttle |
| 3. Carburetor | 11. Hose ; by pass and heater |
| 4. Connector ; M/VAC | 12. Nipple ; heater |
| ▲ 5. Attaching nuts ; carburetor | 13. Air cleaner assembly |
| 6. Water outlet | 14. Pipe ; P.C.V. |
| 7. EFE heater | 15. Hose ; idle compensator |
| 8. Pipe ; mixture control valve | 16. Hose ; P.C.V |

**Important operation — reassembly****5. Attaching nuts ; carburator**

Torque	kg-m(ft.lbs)	1.7 — 2.7 (12.3 — 19.5)
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MAJOR COMPONENT

CYLINDER BODY AND TIMING MECHANISM

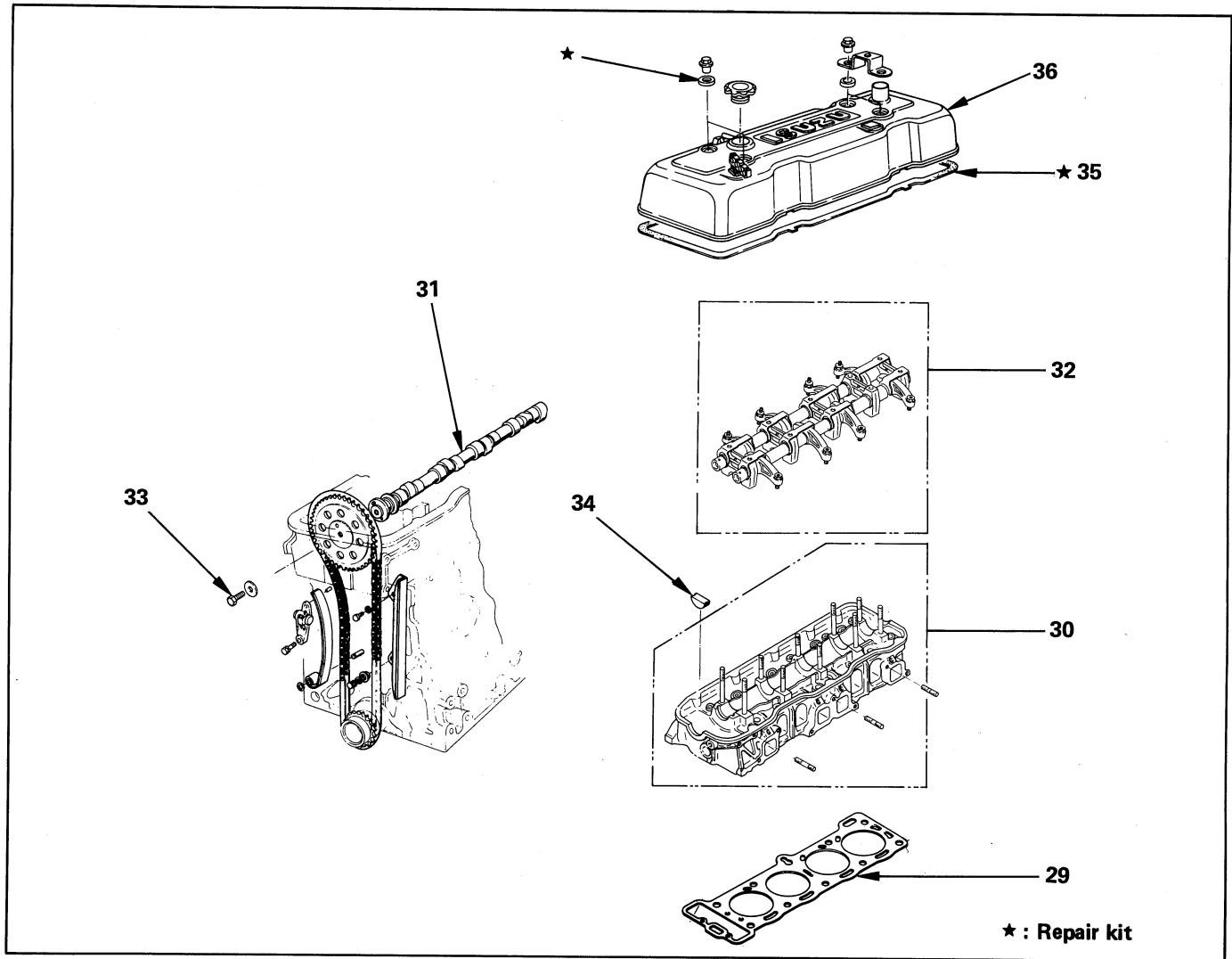


Reassembly steps-1

- | | |
|--|---|
| 1. Cylinder body assembly | ▲ 15. Timing wheel ; crankshaft |
| ▲ 2. Bearings ; crankshaft | ▲ 16. Pinion ; oil pump |
| ▲ 3. Thrust bearings | ▲ 17. Timing chain |
| 4. Crankshaft assembly | ▲ 18. Automatic adjuster |
| ▲ 5. Caps ; crankshaft with bearings | 19. Timing chain tensioner |
| ▲ 6. Gasket ; oil seal retainer | ▲ 20. Camshaft sprocket |
| ▲ 7. Rear oil seal retainer assembly | ▲ 21. Front cover assembly with water pump and oil pump |
| ▲ 8. Rear plate | 22. Boss ; |
| ▲ 9. Flywheel assembly | ▲ 23. Bolt ; boss |
| ▲ 10. Washer ; flywheel | ▲ 24. Crank pulley |
| ▲ 11. Piston and connecting rod with bearing | 25. Oil pipe |
| ▲ 12. Caps ; connecting rod with bearing | ▲ 26. Oil pan and gasket |
| ▲ 13. Timing chain guide | 27. Under cover |
| ▲ 14. Oil jet | 28. Fan pulley |

Invert engine assembly

CYLINDER HEAD, CAMSHAFT AND ROCKER ARM ASSEMBLY

**Reassembly steps-2**

- | | |
|---|-----------------------------|
| ▲ 29. Gasket ; cylinder head | ▲ 34. Rubber plug |
| ▲ 30. Cylinder head assembly | ▲ 35. Gasket ; head cover |
| ▲ 31. Camshaft | ▲ 36. Cover ; cylinder head |
| ▲ 32. Rocker arm shaft bracket assembly | |
| 33. Bolt ; camshaft sprocket | |



Important operations

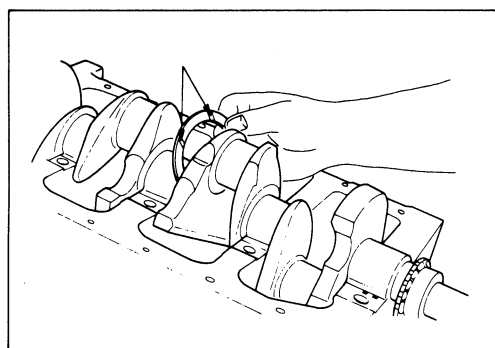
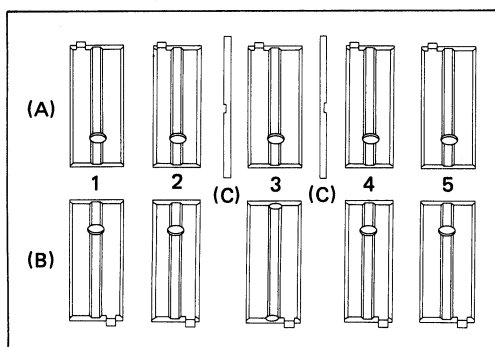


2. Bearings ; crankshaft

Apply generous amounts of engine oil to the crankshaft fitting face of the bearings.

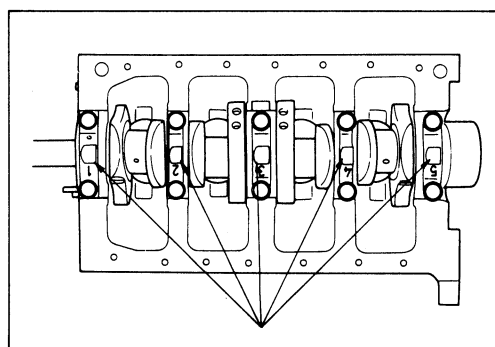


Note: Do not apply oil to the cylinder body fitting face of the bearings.



3. Thrust bearings

Install the thrust bearings with the oil grooved side turned outward.

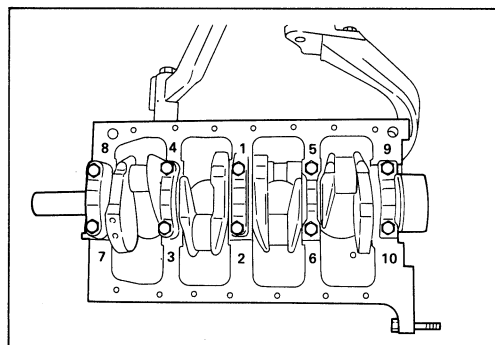


5. Caps ; crankshaft with bearings

Lubricate the threads and the seating face of the bolts with engine oil.



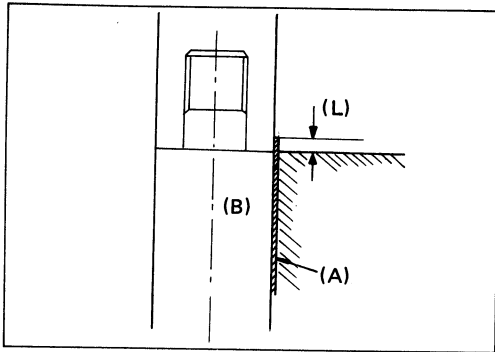
Install the bearing caps in numerical sequence with the arrow mark turned to the front.



First semi-tighten the cap bolts in sequence as illustrated, then fully tighten to the specified torque.

Torque	kg-m(ft.lbs.)	9.0 — 11.0 (65.1 — 79.6)
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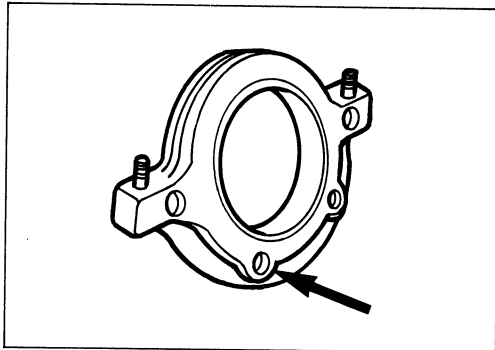
After tightening, check to make certain the crankshaft rotates smoothly.



6. Gasket ; oil seal retainer

Install gasket (A) using adhesive, so that it projects from retainer (B) by length (L).

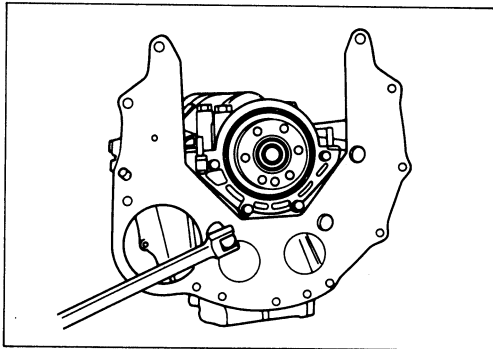
Length (L)	mm(in.)	0.1 — 0.2 (0.004 — 0.008)
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7. Rear oil seal retainer

Apply engine oil to the lipped portion of the rear oil seal.

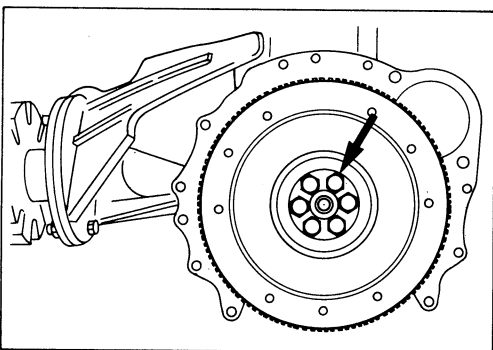
Torque	kg-m(ft.lbs.)	2.4 — 2.6 (17.4 — 19.0)
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8. Rear plate

Install the rear plate in position by aligning it with the dowels on the cylinder body.

Torque	kg-m(ft.lbs.)	4.0 — 6.0 (29.0 — 43.0)
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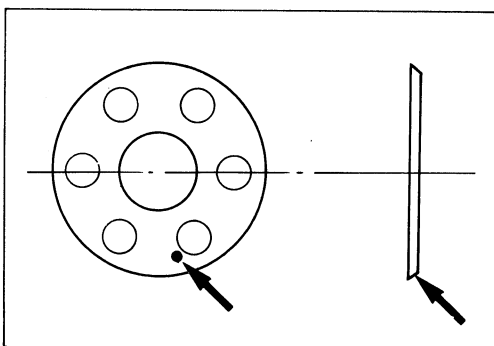
9. Flywheel assembly

The flywheel fixing bolt holes are variable pitched. Install the fixing bolts in the following manner:

- (1) Bring crankpins No. 1 and No. 4 to the top dead center.
- (2) Bring the position flywheel fixing bolt hole with chamfering to the lower left position (with the engine upright).



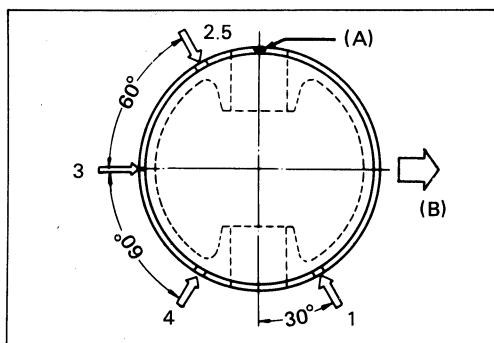
Torque	kg-m(ft.lbs.)	10 — 11.0 (72.3 — 79.4)
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10. Washer ; flywheel

The washer fitting face must be clean and free from oil or grease.

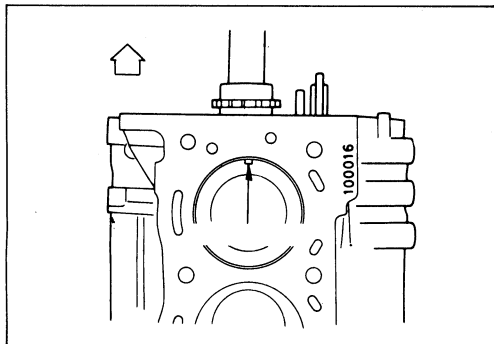
- (1) Turn the chamfered side toward the flywheel and bring the 4 mm (0.16 in.) hole to the right lower position (with the engine upright).
- (2) Tighten the bolts in diagonal sequence.



11. Piston and connecting-rod with bearings

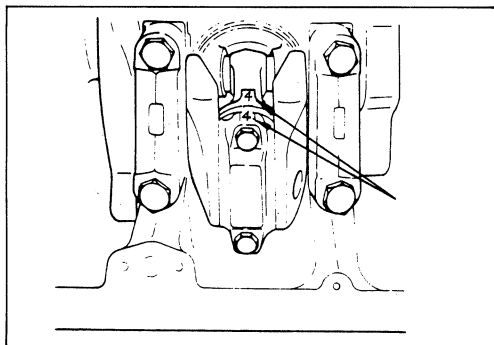
(1) Apply engine oil to the outer circumference of the piston and rotate the piston rings. Set the piston ring gaps as illustrated in the drawing.

1. 1st, Compression ring
2. 2nd compression ring
3. Expander
4. Upper side rail ; oil ring
5. Lower side rail ; oil ring
- A Piston front mark
- B Direction of side thrust



(2) The cutaway portion (arrow mark) of the piston must be turned to the front. (arrow)

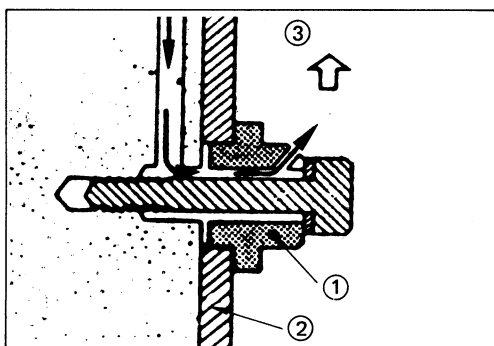
Setting tool : J-8037



12. Caps ; connecting rod with bearing

Install the connecting rod and bearing caps, so that the cylinder number stamped on the bearing cap is turned to the right side of the engine (toward the starter).

Torque	kg-m(ft.lbs.)	5.8 — 6.2 (42.0 — 45.0)
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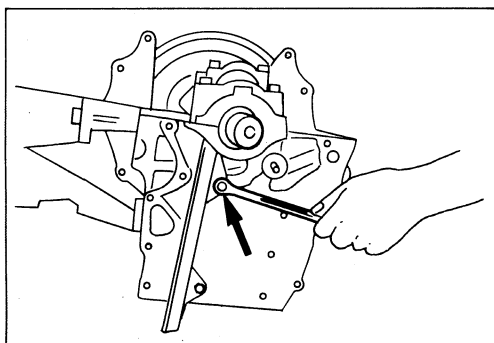


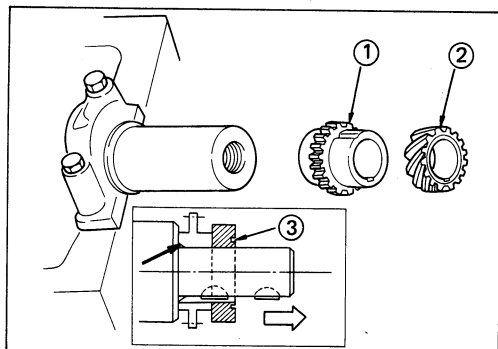
13. Timing chain guide

14. Oil jet

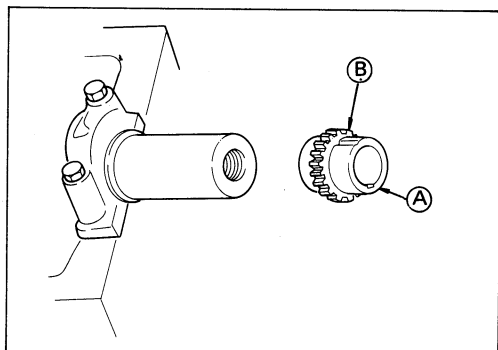
Insert oil jet ① into the slot in chain guide ②, then install the chain guide.

Note: Oil jets must be turned toward the crankshaft ③.

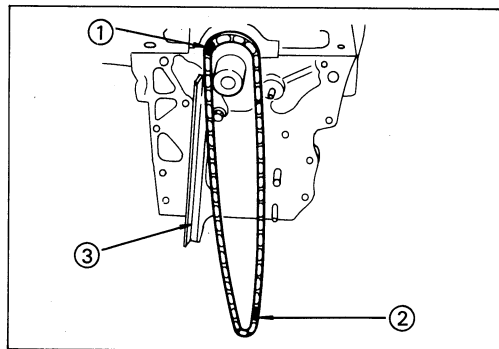


**15. Timing wheel ; crankshaft****16. Pinion ; oil pump**

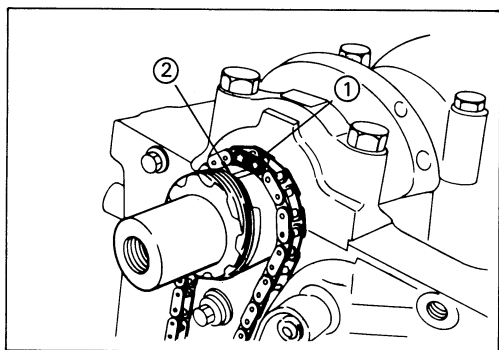
- (1) The chamfered side (arrow) of the timing wheel ① must be turned toward the cylinder body.
- (2) Oil groove ③ in pinion ② must be turned to front of the engine.

**17. Timing chain**

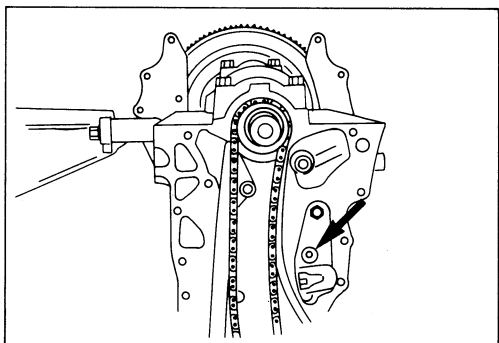
- (1) Bring No. 1 and No. 4 piston to top dead center.
The key groove (A) on the timing wheel should be turned to the cylinder head side and setting mark (B) (slit) to the oil pan side.



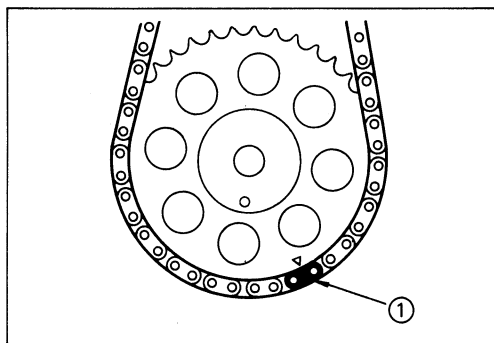
- (2) Install the timing chain, so that the side with the larger number of links (50 links) between the mark plates ① and ② is turned to the chain guide ③.



- (3) Install the timing chain by aligning the mark plate ① with the setting mark ② on the timing wheel.

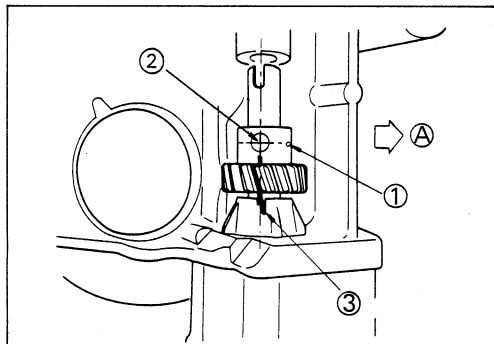
**18. Automatic adjuster**

Install the automatic adjuster with the shoe set in the fully retracted position.



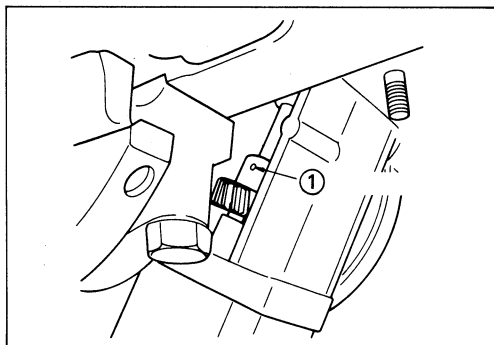
20. Camshaft sprocket

Align Δ mark on the sprocket with mark plate ① on the timing chain.

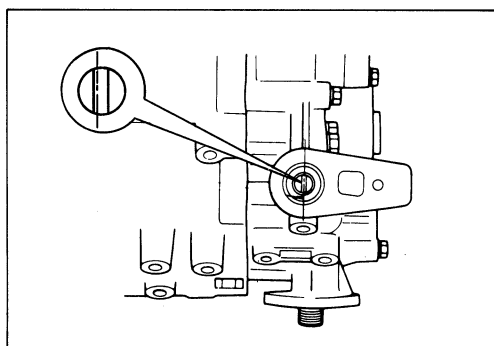


21. Front cover assembly with water pump and oil pump

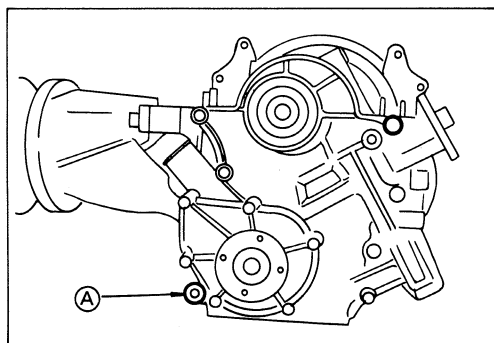
- (1) Bring the piston in No. 1 and No. 4 cylinders to top dead center on the compression stroke.
- (2) Apply liquid gasket to the joining face of the front cover and cylinder body.
- (3) Turn punch mark ① on the oil pump drive gear toward oil filter (A) and bring the center of dowel pin ② into alignment with mark ③ on the oil pump case.



- (4) After installation of the front cover assembly, check that the punch mark ① on the oil pump drive gear is turned rearward when viewed through the clearance between the cylinder block and the front cover.



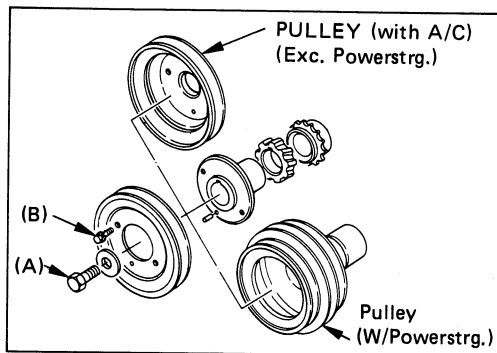
- (5) Also check that the slot in the oil pump shaft is in parallel with the front face of the cylinder block and that the slot is offset to the front side when viewed from the distributor fitting hole.



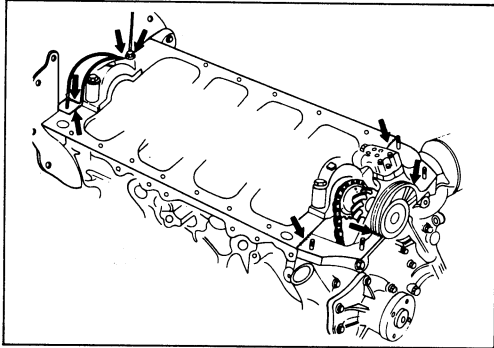
- (6) Tighten the fixing bolt of the front cover assembly to the specified torque.

Torque		
kg-m	(ft.lbs.)	
2.4 — 2.6	(17.4 — 19.0)	

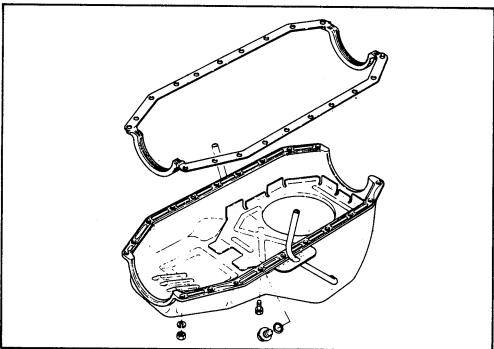
- 1) Semi-tighten the adjust plate (AC generator) fixing bolt ①.
- 2) Cut off the excess portion of the gasket after installation of the front cover.

**23. Bolt ; boss****24. Crank pulley**

kg-m(ft.lbs.)		
Torque	Boss bolt (A)	10.5—13.5(76.0—97.6)
	Pulley bolt (B)	2.4—2.6(17.4—19.0)

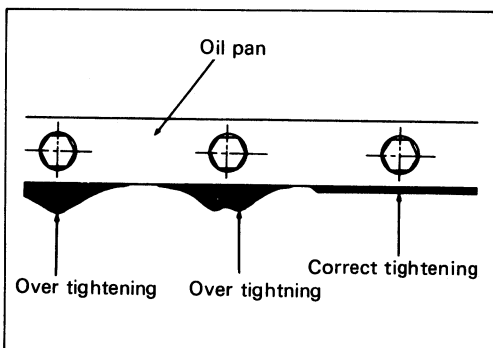
**26. Oil pan and gasket**

- 1) Apply a thin coat of Permatex #2 (or equivalent) to the positions shown in figure.



- 2) Install a new oil pan gasket, aligning the holes and then install the oil pan on the cylinder block.

Torque	kg-m(ft.lbs.)	0.4 — 0.6 (2.9 — 4.34)
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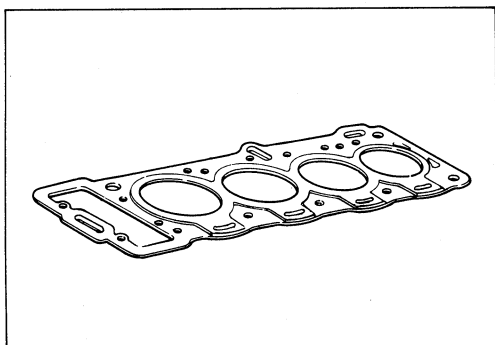


Check the edge of the gasket to make certain the gasket is set in position correctly. If the projection of the gasket edge beyond the oil pan flange is uneven, remove and reinstall.



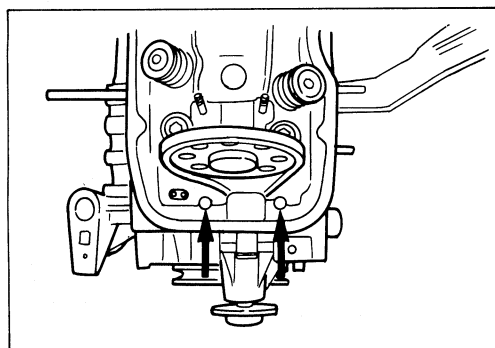
Invert the engine assembly

Perform this operation carefully so as not to let the crankshaft sprocket slide out of position.



29. Gasket ; cylinder head

Install the cylinder head gasket with the "top" mark side up by aligning it with the dowels on the cylinder block.

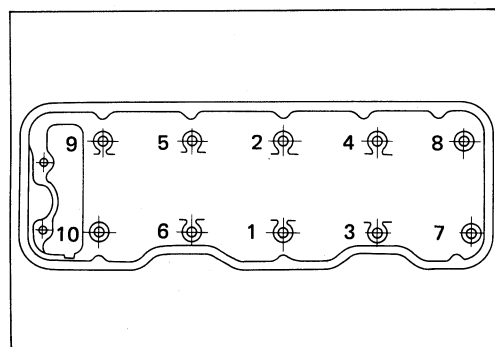


30. Cylinder head assembly

Apply a thin coat of clean engine oil to the threaded portion of the cylinder head bolts. Inseat and semi-tighten the bolts.



(1) Apply a thin coat of engine oil to the bolts fixing the front cover (arrow).



(2) Tighten the bolts to a torque of 8.5 kg-m (61.5 ft. lbs.) in sequence as illustrated in the drawing, using an extension bar. Retighten the bolts to the specified torque.



Wrench : J-24239-01

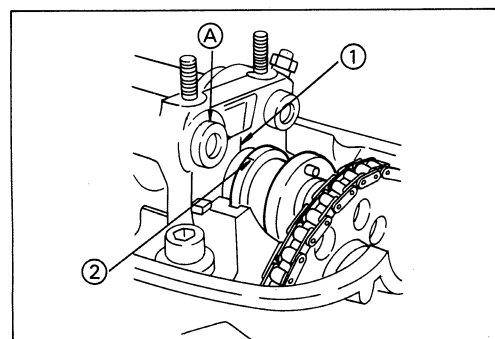
kg-m(ft.lbs.)		
Torque	First step:	8.5 (61.5)
	Final step:	10.0 (72.0)

(3) Fully tighten the bolts holding the front cover assembly.



31. Camshaft

Apply generous amounts of clean engine oil to the camshaft journals. Turn the camshaft slowly to facilitate setting.

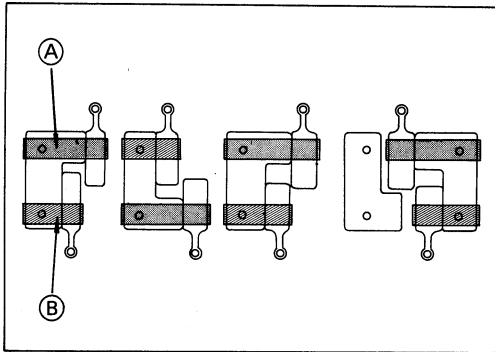


32. Rocker arm shaft bracket assembly



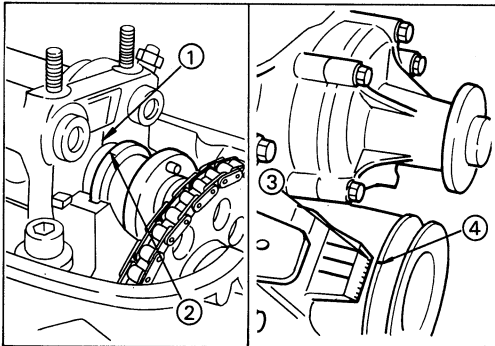
(1) Turn the rocker arm shaft to bring the punch mark ① side up, then install the rocker arm shaft bracket assembly.

(2) Align setting mark ① on the No. 1 rocker arm shaft bracket the mark ② on the camshaft.

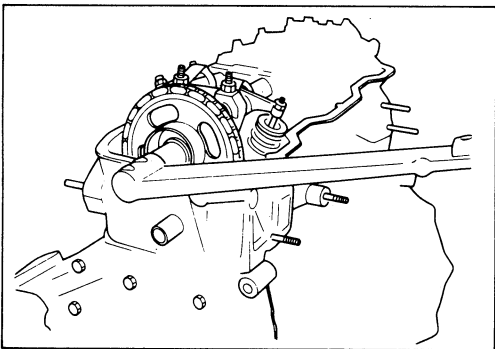


- (3) Install rocker arm springs **A** and **B**, then tighten the fixing bolts to the shaft brackets.

Torque	kg-m(ft.lbs.)	2.1 — 2.3 (15.2 — 16.6)
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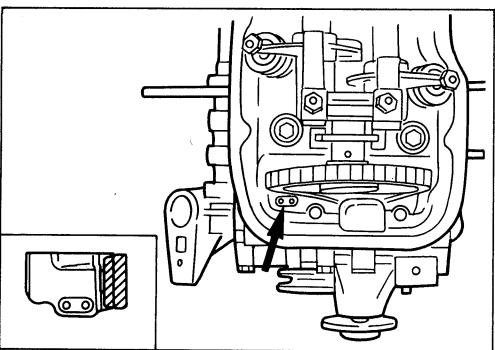


- (4) Check that the mark on shaft bracket **1** and on camshaft **2** are in alignment and that the mark "O" **3** on the front cover is aligned with slot **4** in the crank pulley.

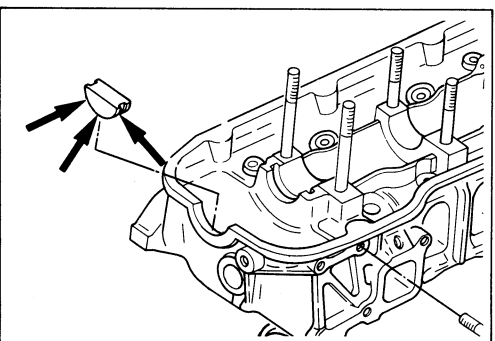


- (5) Attach the camshaft sprocket to the camshaft.

Torque	kg-m(ft.lbs.)	7.0 — 9.0 (50.6 — 65.0)
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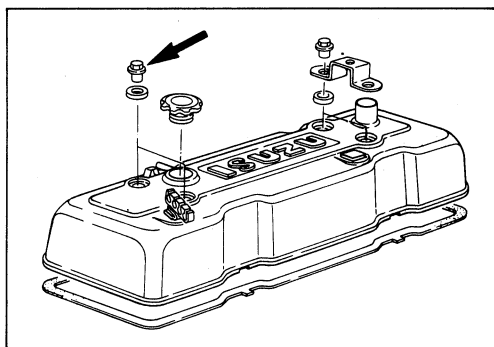


- (6) Set the automatic adjuster by turning the adjuster slide pin 90 degrees counter-clockwise with a screw driver. When the automatic adjuster installation is completed check the timing chain for proper tension.



34. Rubber plug

Apply liquid gasket to the arched portion of the rubber plug to prevent oil leaks.



Adjustment of valve clearance
Refer to section 00 on valve clearance servicing.

35. Gasket ; head cover

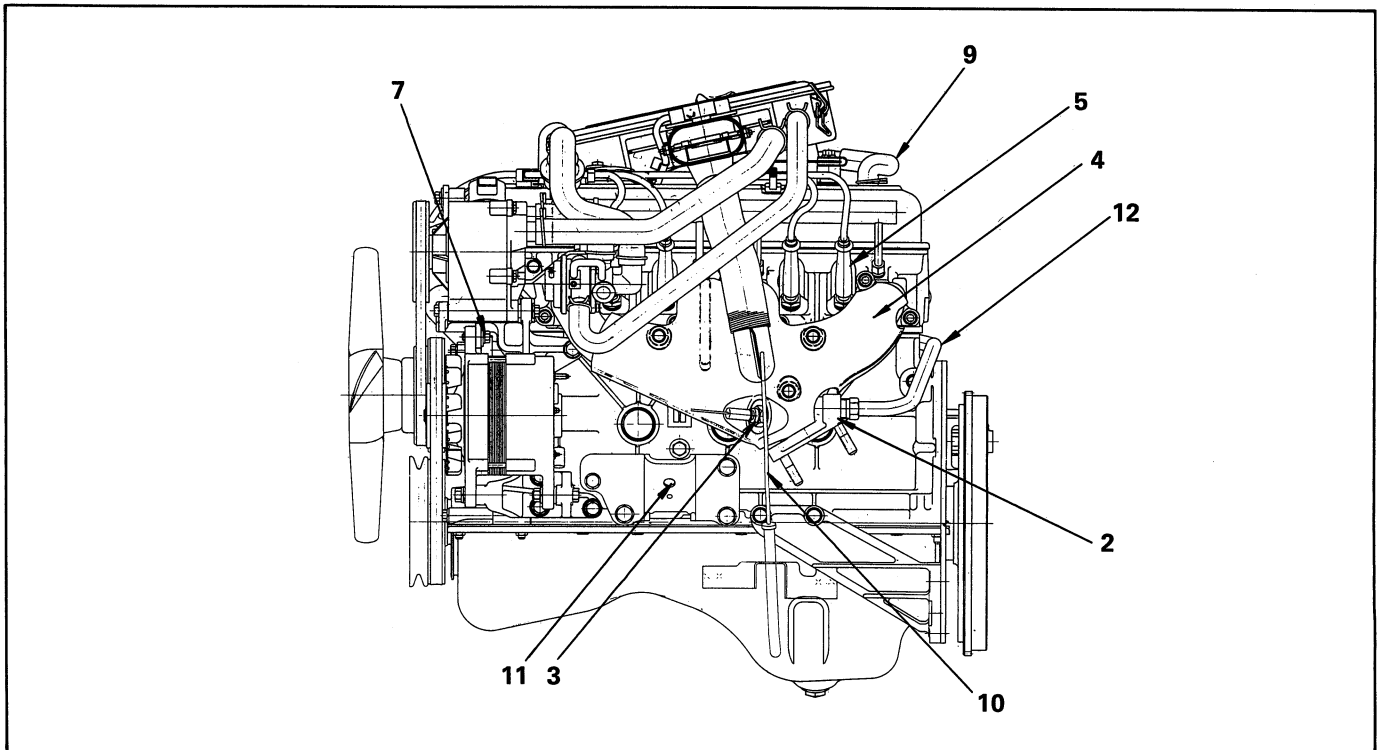
Apply liquid gasket to the cylinder head cover gasket, then install the gasket on the cylinder head cover.



36. Cover ; cylinder head

Torque	kg-m(ft.lbs.)	0.4 — 0.6 (2.90 — 4.34)
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EXTERNAL PARTS (Left hand side)



Reassembly steps-1

- | | |
|---|-------------------------------|
| 1. Gasket ; exhaust manifold | 7. Generator and adjust plate |
| ▲ 2. Exhaust manifold | 8. Belt ; generator |
| ▲ 3. O ₂ sensor (California only) | 9. Rubber hose ; blow by |
| 4. Heat protector | 10. Oil level gauge |
| 5. Spark plug | 11. Bracket ; engine mounting |
| 6. Oil pump with bracket ; power steering
(If so equipped) | 12. EGR pipe |



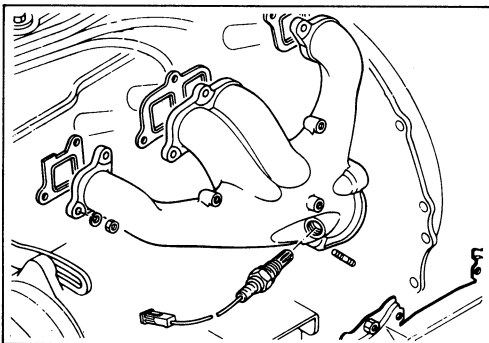
Important operations

2. Exhaust manifold

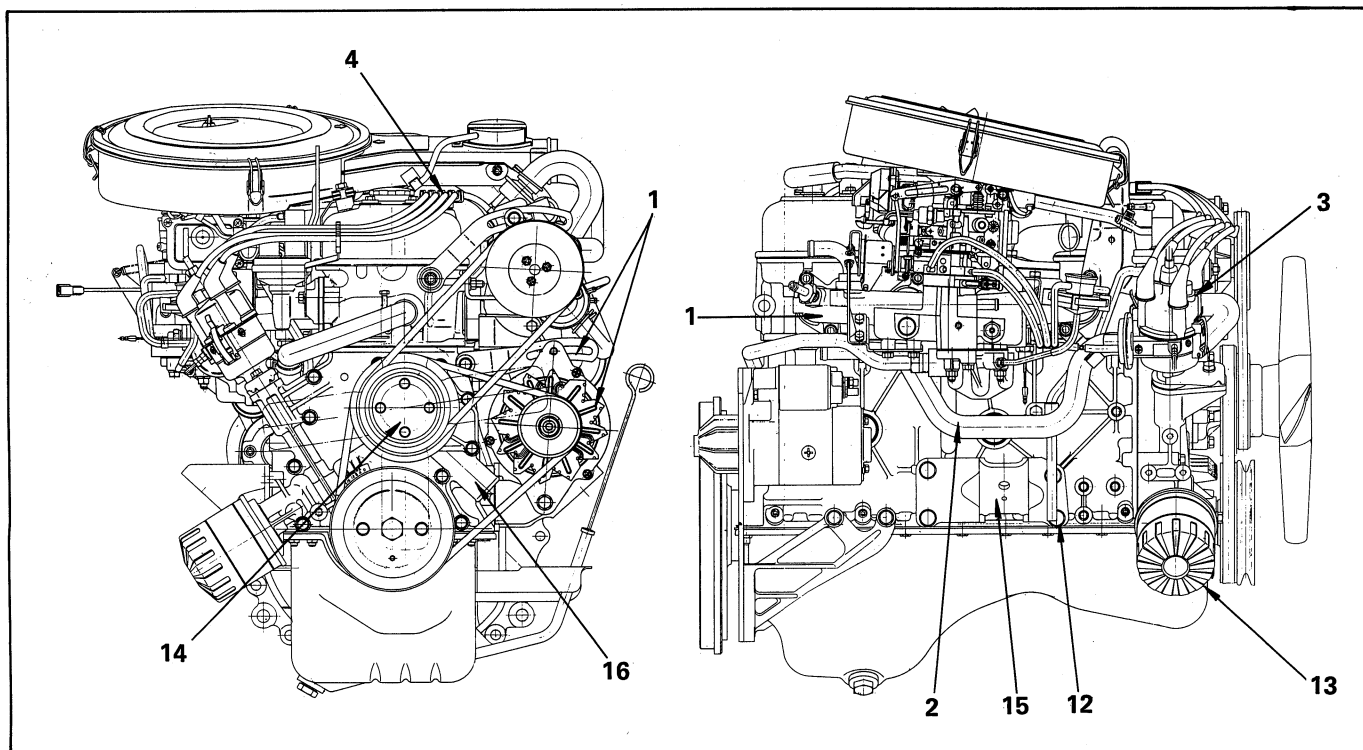
Torque		kg-m(ft.lbs.)
		1.9 — 2.5 (13.7 — 18.1)

3. O₂ sensor (California)

Apply rubber sealer to the threads before installation.

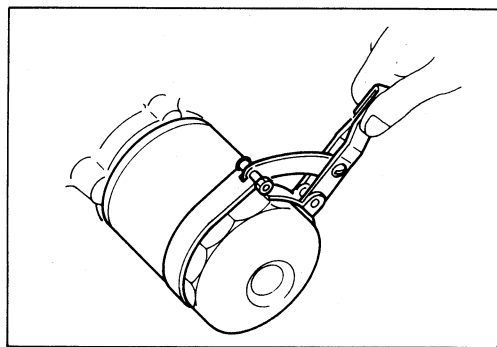


EXTERNAL PARTS (Front and Right hand side)



Reassembly steps-2

- | | |
|--|---|
| 1. Intake manifold with carburator | 9. Belt air compressor (If so equipped) |
| 2. Water hose ; cylinder head to 3 way pipe | 10. Pulley ; idler, oil pump, power steering (If so equipped) |
| 3. Distributor assembly | 11. Belt ; oil pump, power steering (If so equipped) |
| 4. High tension cord | 12. Switch ; oil pressure |
| 5. Oil pressure unit (If so equipped) | ▲ 13. Oil filter |
| 6. Bracket ; air compressor (If so equipped) | 14. Fan and clutch assembly |
| 7. Air compressor assembly (If so equipped) | 15. Bracket ; engine mounting |
| 8. Pulley ; tension, air compressor (If so equipped) | 16. Rubber hose ; water pump to radiator |



13. Oil filter

1. Apply engine oil to the entire circumference of the oil filter O-ring.
2. Turn in the oil filter element until the O-ring is seated against the filter body. Further turn in the filter 1 turn using a filter wrench.



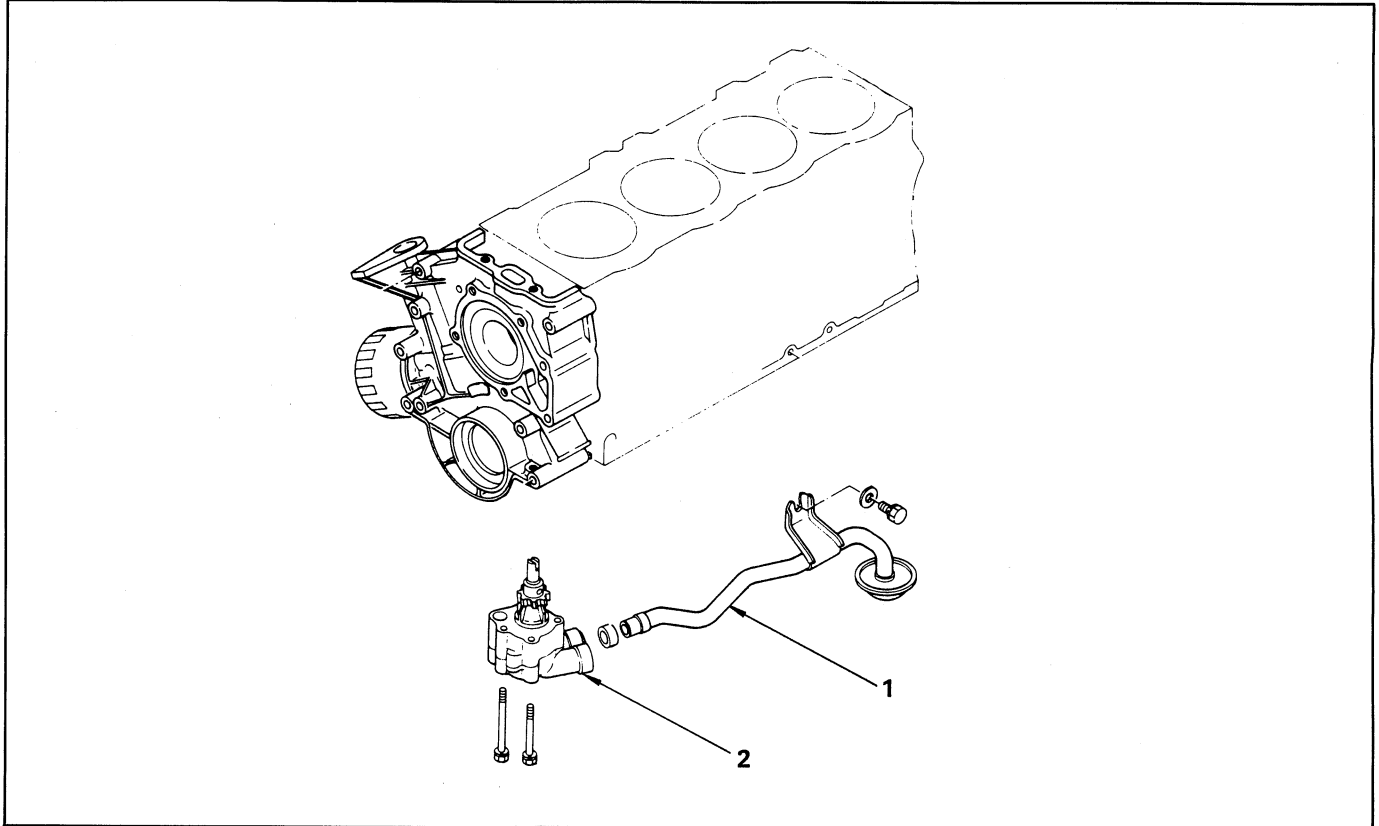
The filter wrench should be fitted against the portion near the bottom of the filter.

LUBRICATING SYSTEM

OIL PUMP



REMOVAL AND INSTALLATION



Removal steps

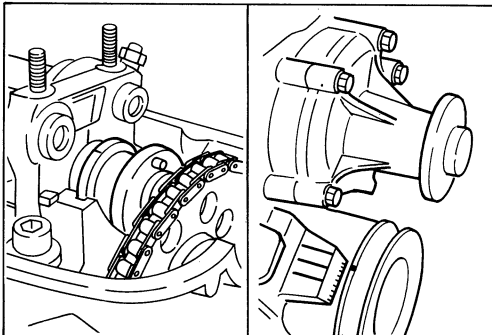
1. Pipe assembly
2. Pump assembly

Installation steps

- ▲ 2. Pump assembly
1. Pipe assembly

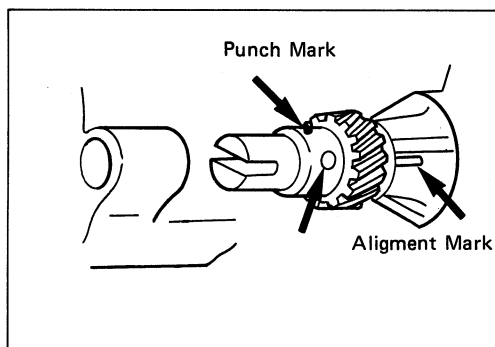


Important operations — installation

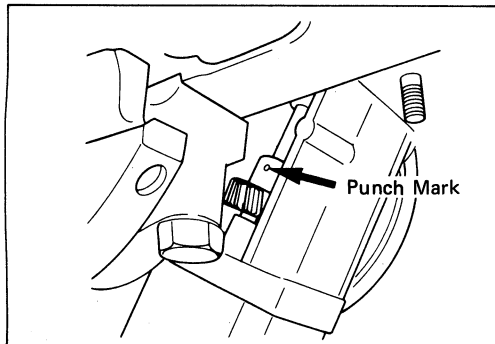


2. Pump assembly

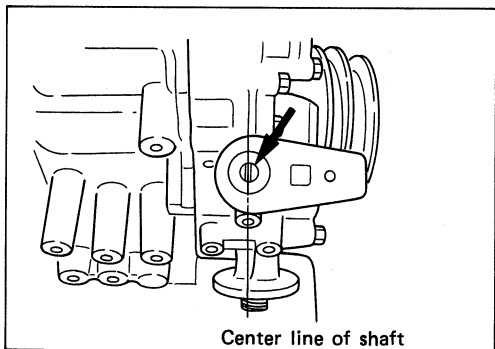
- (1) Align the mark on the camshaft with the mark on the No. 1 rocker arm shaft bracket, and the notch in the crankshaft pulley with the "O" timing mark on the front cover. When the marks are in alignment, the pistons in No. 1 and No. 4 cylinders are at top dead center on the compression stroke.



- (2) Install the oil pump by aligning the marks, with the punched mark away from the water pump.



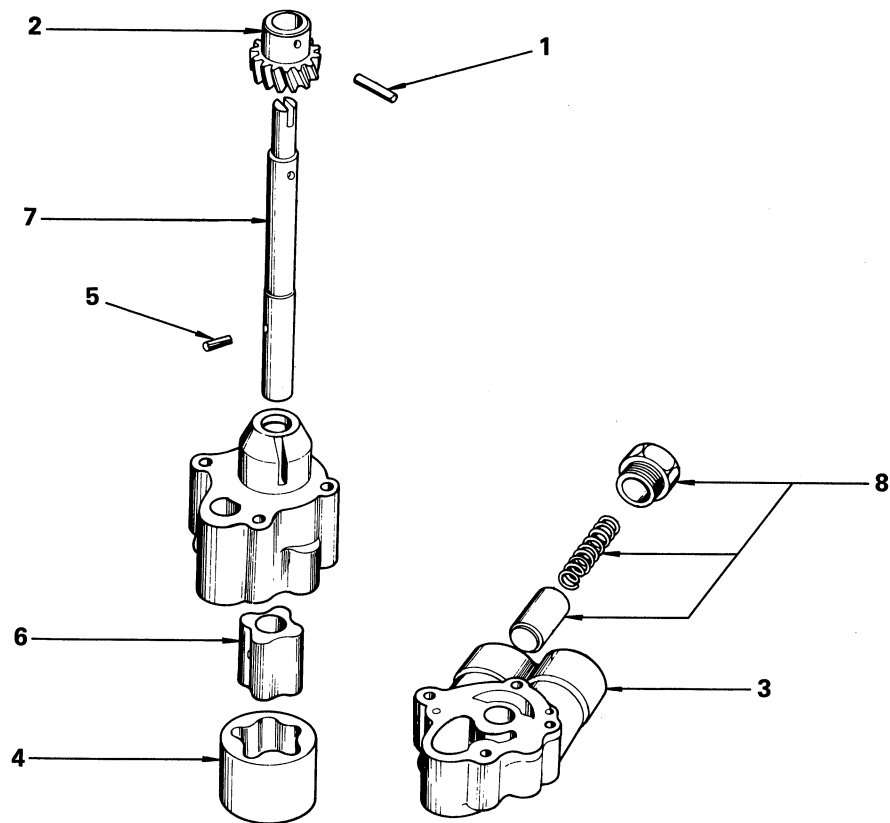
- (3) When oil pump installation is completed, check that the punched mark on the drive shaft is away from the water pump, when viewed through the clearance between the cylinder block and the front cover.



- (4) Check that the slot at the end of the drive shaft is in parallel with the front face of the cylinder block and is offset forward, when viewed through the distributor fitting hole.



DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Gear pin
2. Drive gear
3. Cover assembly
4. Driven rotor
5. Rotor pin
6. Drive rotor
7. Drive shaft
8. Plug ; relief valve

Resassembly steps

To install, follow the disassembly procedure in reverse order.



INSPECTION AND REPAIR

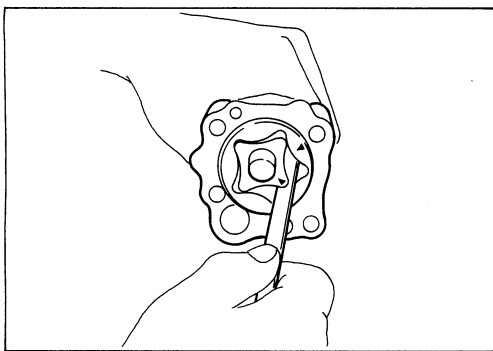
Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Relief valve and spring
- Pump body and cover
- Drive gear



Visual check

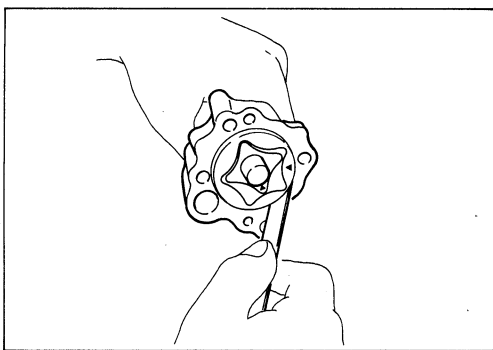
Inspect the following parts for wear, damage or other abnormal conditions.



Clearance between the driven rotor and the pump body.

mm (in.)

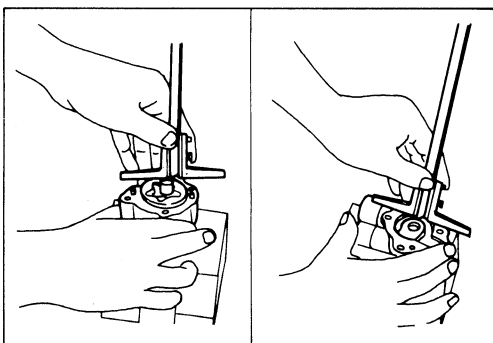
Standard	Limit
0.16 — 0.22 (0.00630) — (0.00867)	0.25 (0.00985)



Clearance between the drive rotor and the driven rotor.

mm (in.)

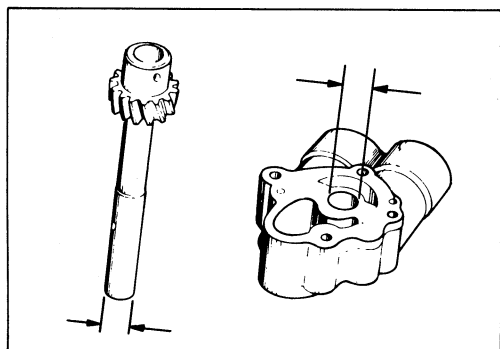
Standard	Limit
0.13 — 0.15 (0.00512) — (0.00591)	0.2 (0.00788)



Clearance between the drive rotor, the driven rotor and the oil pump cover.

mm (in.)

Standard	Limit
0.03 — 0.09 (0.00118) — (0.00355)	0.15 (0.00591)



Clearance between the drive shaft and the pump cover.

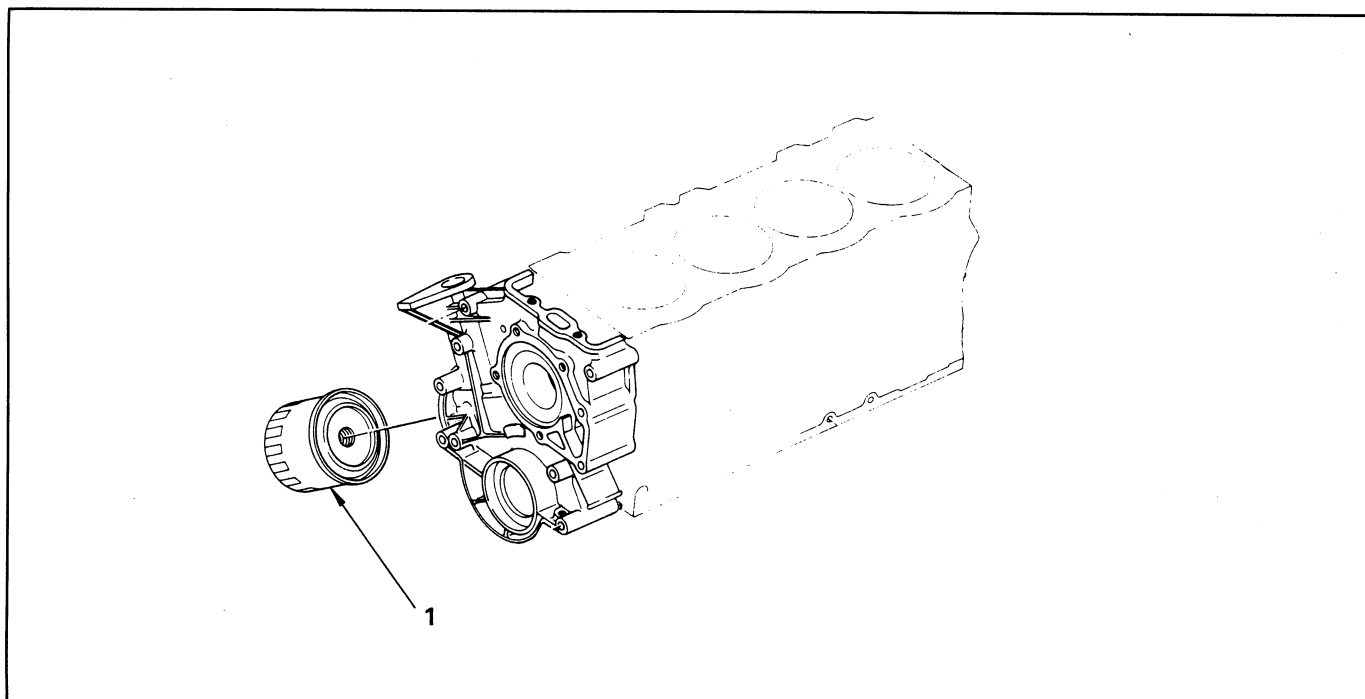
mm(in.)

Standard	Limit
0.07 - 0.11 (0.00276) - (0.00433)	0.25 (0.00985)

OIL FILTER



REMOVAL AND INSTALLATION



Removal steps

- ▲ 1. Oil filter assembly

Installation steps

- ▲ 1. Oil filter assembly

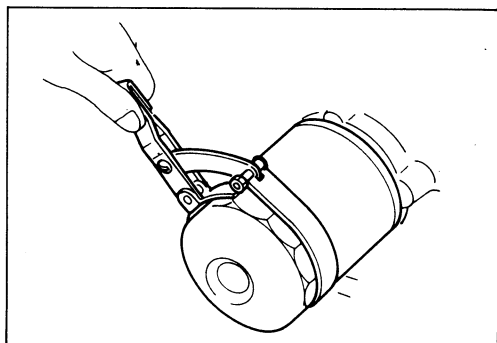


Important operation — removal



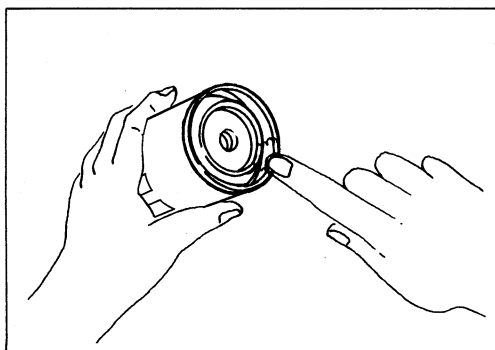
1. Oil filter assembly

Wrench : J-22700





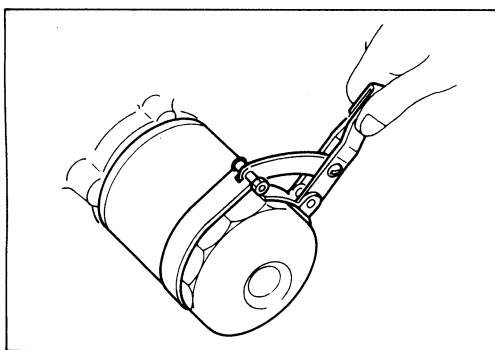
Important operation — installation



1. Oil filter



- (1) Apply engine oil to the entire circumference of the oil filter O-ring.



- (2) Turn in oil filter element until the O-ring is seated against the filter body. Further turn in the filter 1 turn using filter wrench.



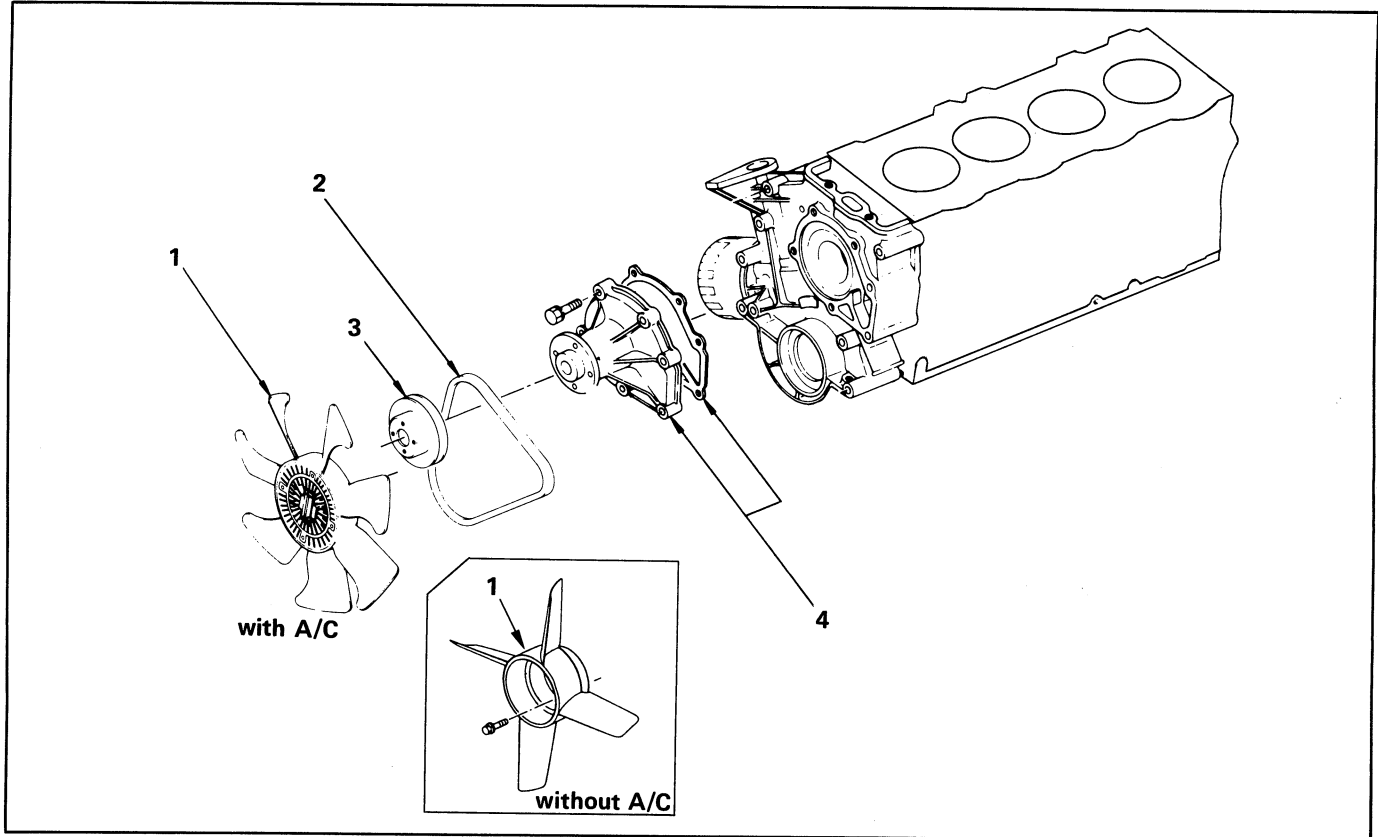
Filter wrench should be fitted against the portion near the bottom of the filter.

COOLING SYSTEM

WATER PUMP



REMOVAL AND INSTALLATION

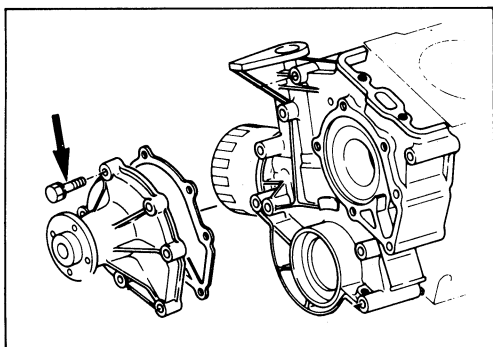


Removal steps

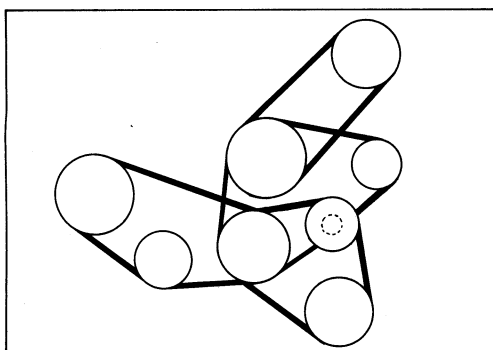
1. Fan ; cooling
2. Belt ; cooling fan
3. Pulley ; water pump
4. Water pump and gasket

Installation steps

- ▲ 4. Water pump and gasket
3. Pulley ; water pump
2. Belt ; cooling fan
1. Fan ; cooling

**Important operations — Installation****4. Water pump and gasket**

Torque	kg-m(ft.lbs.)	2.4 — 2.6 (17.4 — 19.0)
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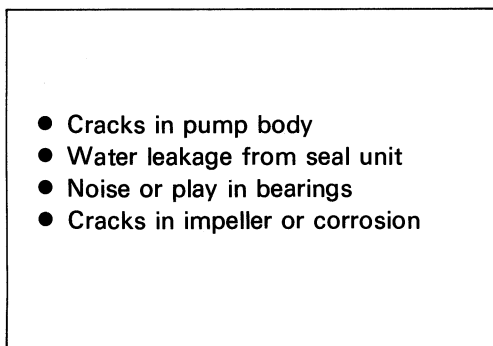


Check and adjust the belt tension as necessary by moving the generator pulley

Fan belt deflection	mm (in.)	Approx. 10 (0.3937)
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**INSPECTION AND REPAIR**

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

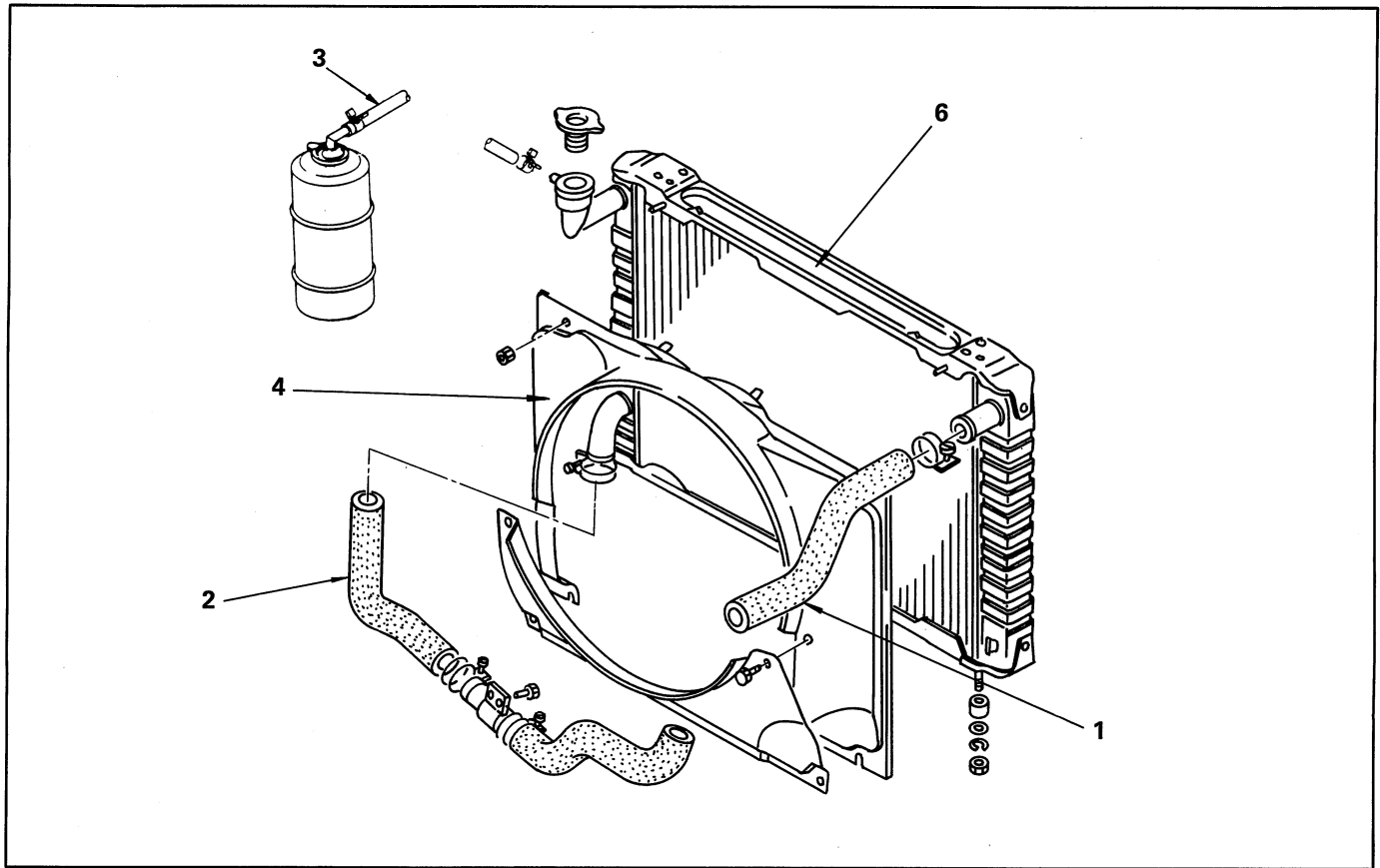


The water pump is an integral unit and the entire pump assembly must be replaced when any of the conditions included in the listing at left apply.

RADIATOR



REMOVAL AND INSTALLATION



Removal steps

1. Top hose
2. Bottom hose
3. Hose ; surge tank
4. Fan shroud
5. Stay
6. Radiator assembly

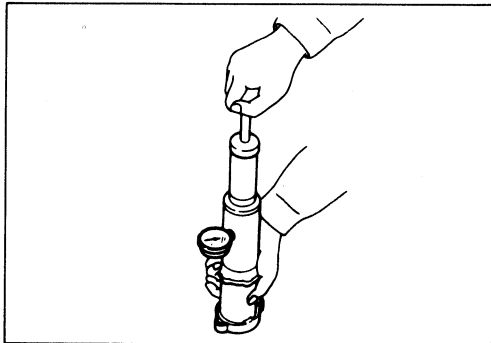
Installation steps

To install, follow the removal procedure in reverse order.



INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



(1) Radiator filler cap

Check the filler cap pressure valve opening pressure using a radiator filler cap tester. If the measurement deviates from the specified range, replace the cap assembly with a new one.



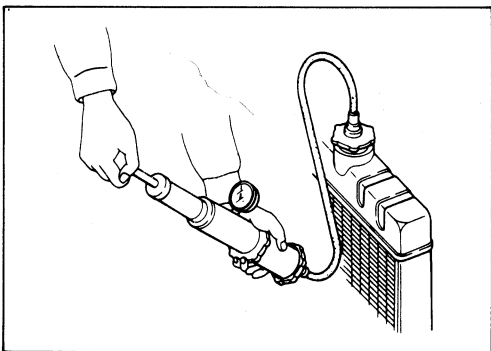
Cap tester : J24460-01

Pressure valve	kg/cm ² (psi)	0.8 — 1.2 (12.8 — 17.1)
----------------	--------------------------	-------------------------

Check the condition of the vacuum valve at the center part of the valve seat on the filler cap. Replace the cap with a new one if it is found to be rusted or fouled.

Negative pressure valve	kg/cm ² (psi)	0.04 — 0.05 (0.6 — 0.7)
-------------------------	--------------------------	-------------------------

Check to see if the vacuum valve can be operated smoothly by hand. Clean or replace the valve with a new one if necessary.



(2) Inspection of the radiator for leakage

Check the cooling system for leakage at the following points by applying a pressure of 2 kg/cm² (28.5 psi) with a cap tester:

- Leakage from the radiator
- Leakage from the water pump
- Leakage from the water hoses
- Check the rubber hoses for swelling.



Cap tester : J-24460-01



(3) Radiator core

Thoroughly clean the radiator core to remove deposits of foreign matter from the front face and from between the cooling fins.

If the cooling fins are found to be distorted, make corrections taking care not to damage the joining portions between the fins and the water tubes.



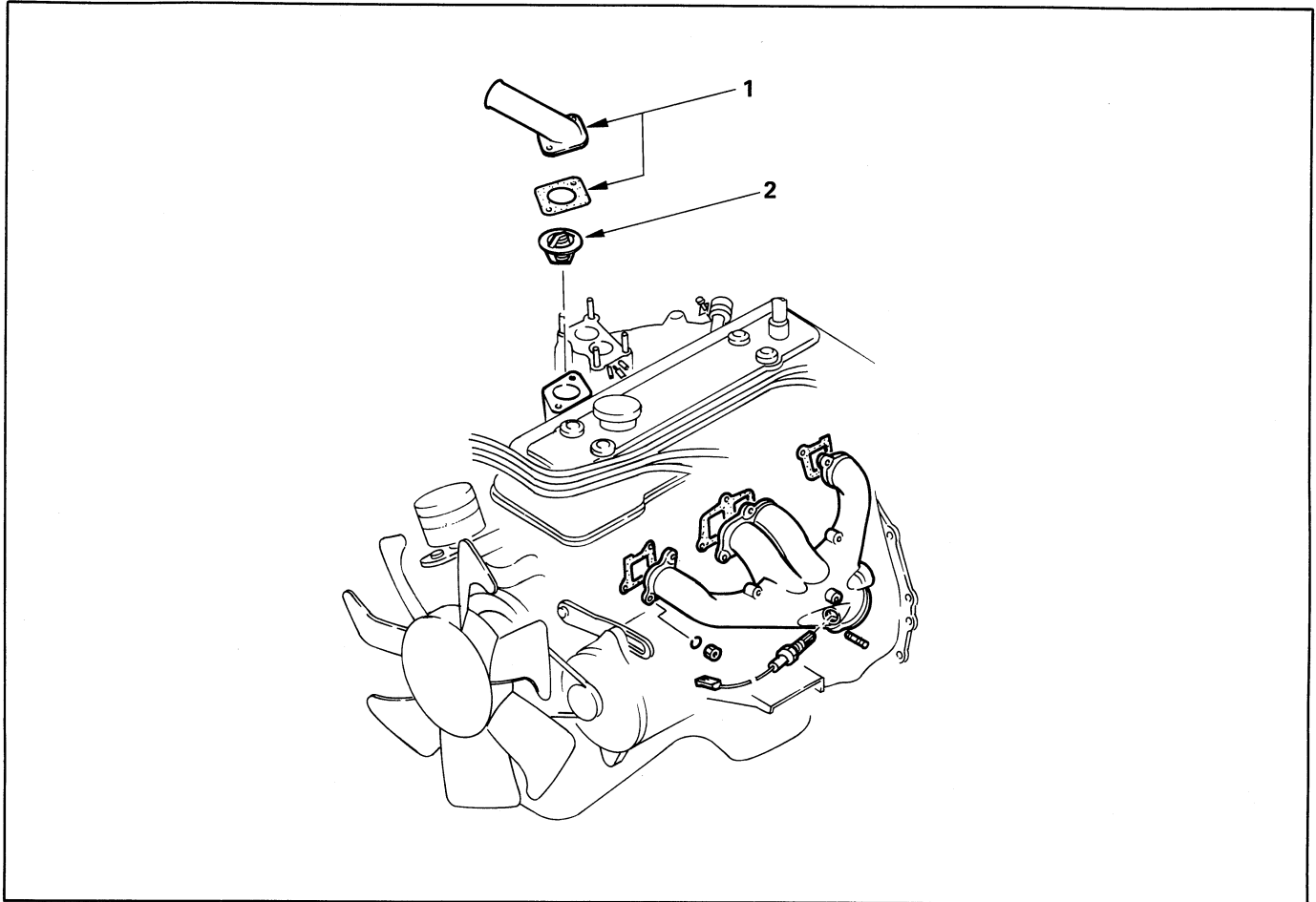
(4) Water hoses

Check the top and bottom hoses for deterioration, swelling, or damage, and replace with new ones as necessary.

THERMOSTAT



REMOVAL AND INSTALLATION



Removal steps

1. Water outlet pipe and packing
2. Thermostat

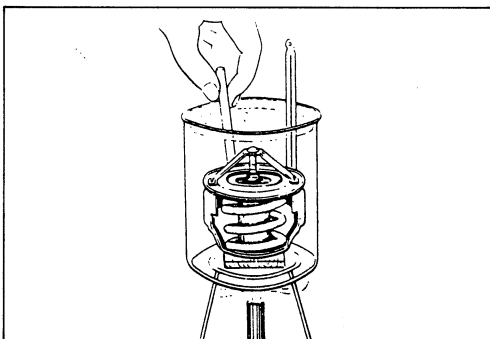
Installation steps

To install, follow the removal procedure in reverse order.



INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

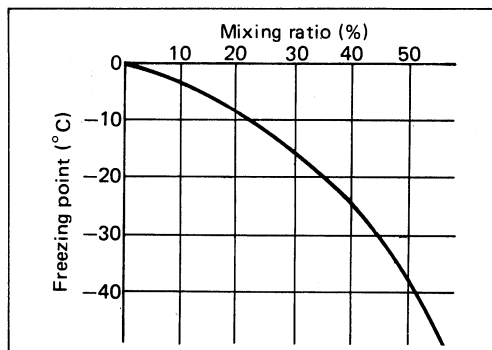


Submerge the thermostat assembly in water completely and check the temperatures at which valve begins to open and finally becomes wide open, by increasing the temperature gradually.

Valve opening temperature	82°C (180°F)
Valve lift mm(in.)	8 (0.315) or more at 95°C (203°F)

Stir the water constantly. Do not heat the thermostat directly.

ANTI-FREEZE SOLUTION



Mixing ratio (%)	Anti-freeze solution lit.(gal.)	Water lit.(gal.)
0	0	6 (1.5850)
5	0.3(0.0793)	5.7(1.5059)
10	0.6(0.1585)	5.4(1.4267)
15	0.9(0.2378)	5.1(1.3474)
20	1.2(0.3170)	4.8(1.2682)
25	1.5(0.3963)	4.5(1.1889)
30	1.8(0.4756)	4.2(1.1096)
35	2.1(0.5548)	3.9(1.0304)
40	2.4(0.6341)	3.6(0.9511)
45	2.7(0.7133)	3.3(0.8719)
50	3.0(0.7926)	3.0(0.7926)

1. Relation between the mixing ratio and the freezing point

The freezing temperature of the engine coolant varies with the amount of anti-freeze solution in water.

The proper mixing ratio can be determined by referring to the chart. Supplemental inhibitors or additives claiming to increase cooling capability that have not been specifically approved by Isuzu are not recommended for addition to the cooling system.

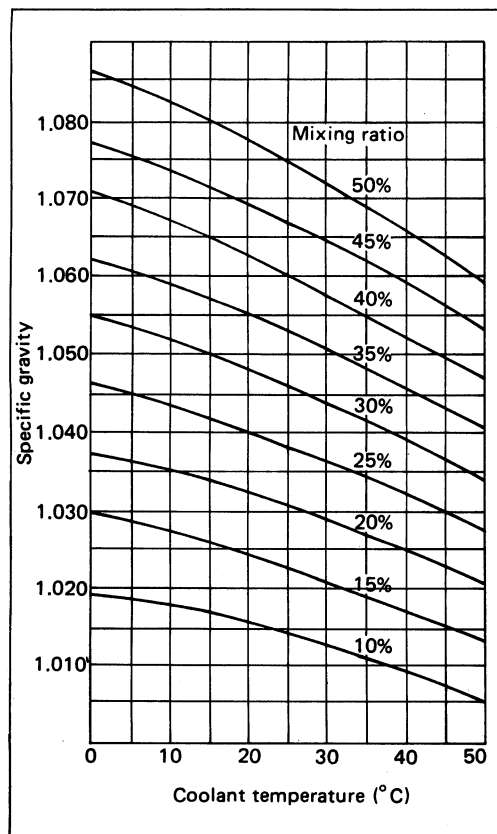
2. Calculation on mixing ratio

$$\text{Mixing ratio} = \frac{\text{Anti-freeze solution (Lit/gal.)}}{\text{Anti-freeze solution (Lit/gal.)} + \text{Water (Lit/gal.)}}$$

NOTE: Anti-freeze solution + Water = 6 lit. (1.5850 gal.)

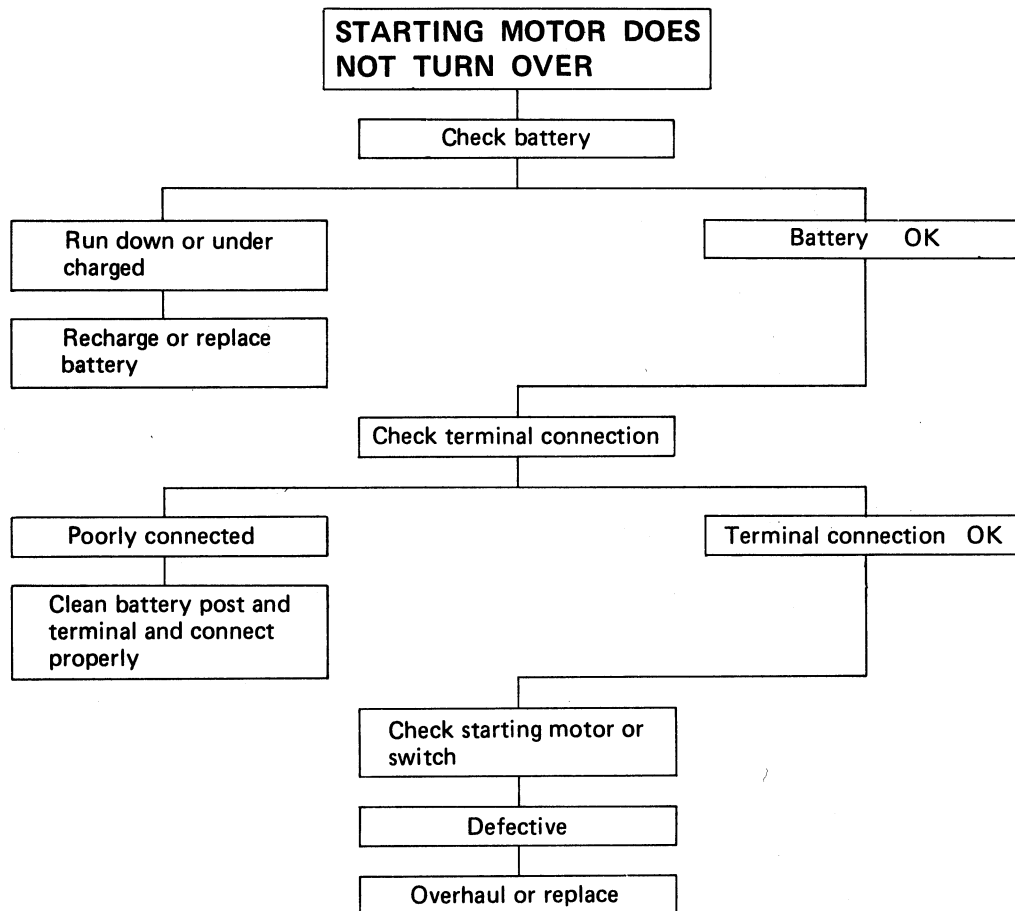
3. Mixing ratio

Check the specific gravity of the engine coolant in the cooling system at temperatures ranging from 0°C to 50°C using a suction type hydrometer, then determine the density of the coolant by referring to the table at left.



DIAGNOSIS

HARD STARTING



Troubleshooting Procedure

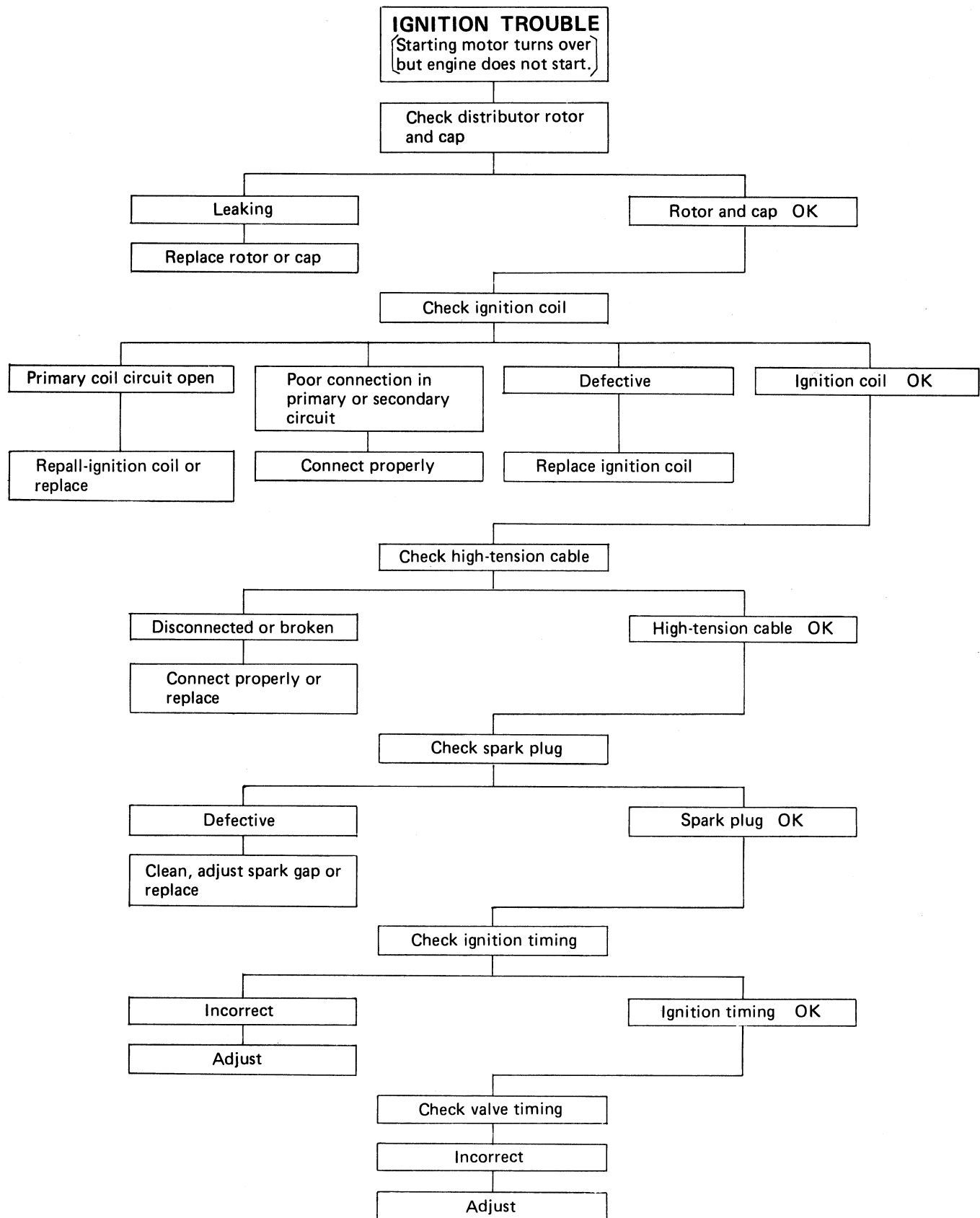
Turn on headlights and starter switch.

Headlights go out or dim considerably.

- a) Battery undercharged.
- b) Starting motor coil circuit shorted.
- c) Starting motor parts defective.

Headlights stay bright

- a) Starting motor circuit open.
- b) Starting motor coil open.
- c) Starting switch defective.



Spark Test

Remove the high-tension cable from any spark plug. Hold the end of the high-tension cable close to the engine block and while cranking engine, check to see if a spark jumps across the gap.

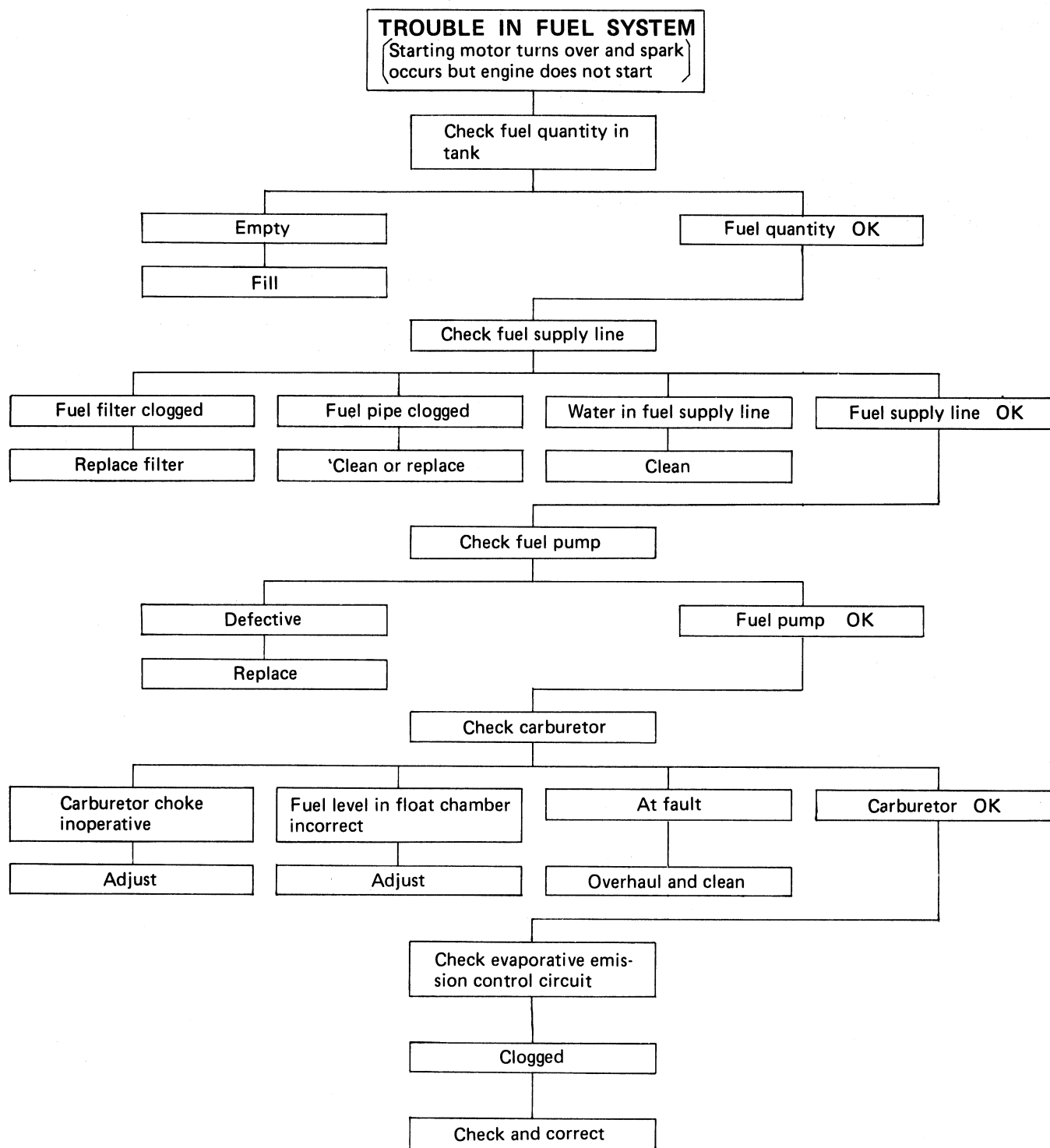
Be sure to cover the high-tension cable with dry paper, or some other good insulating material to prevent shock before cranking the engine.

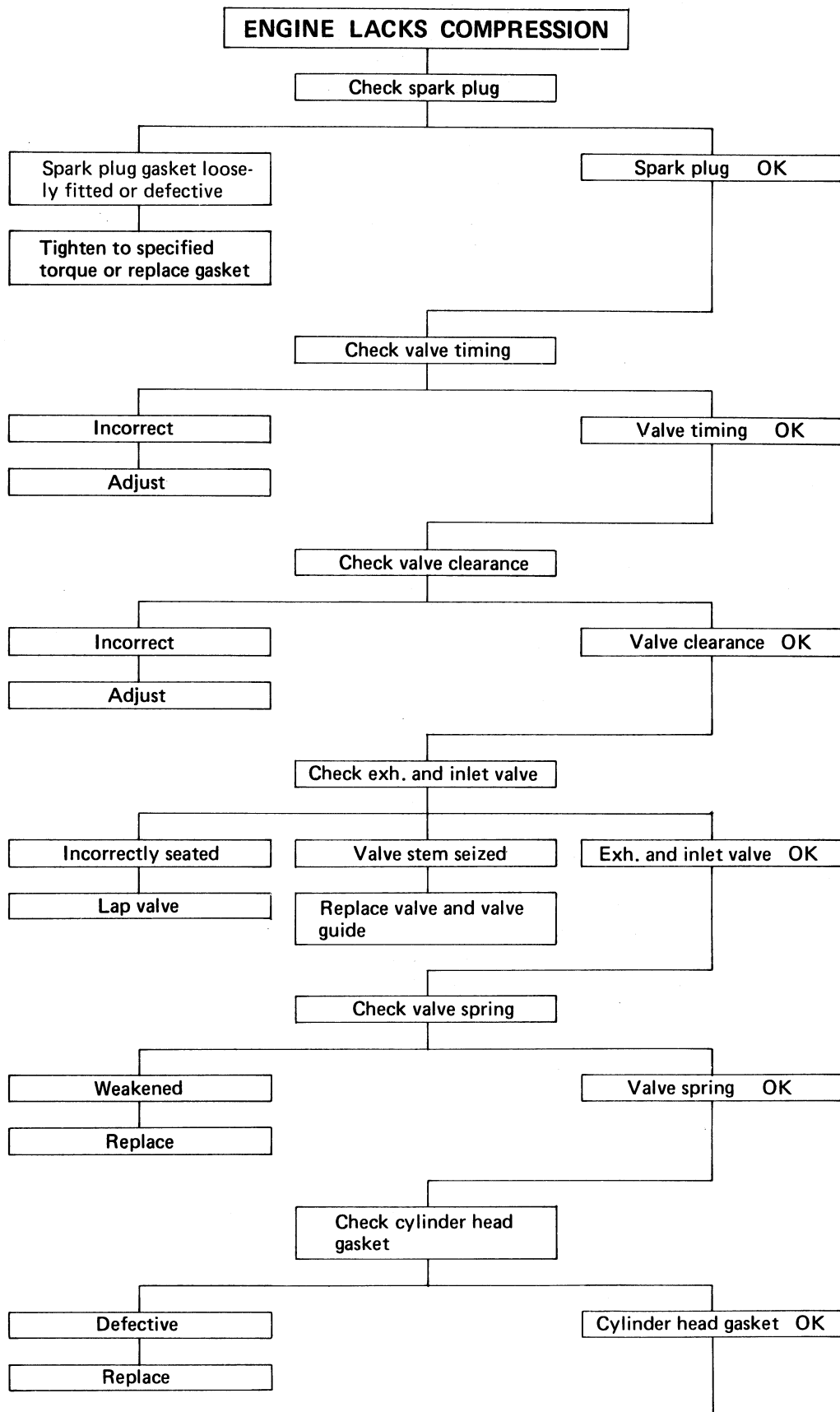
Spark jumps across the gap.

- a) Ignition timing incorrect.
- b) Spark plug defective.
- c) Fuel not reaching carburetor or engine.
- d) Engine lacks compression.

No sparking takes place.

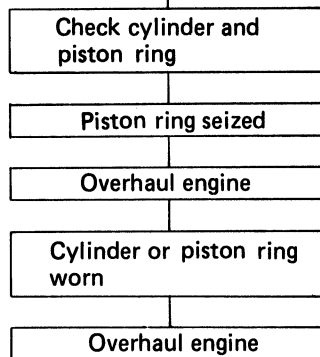
- a) Primary coil circuit shorting.
- b) Distributor air gap incorrect.
- c) Distributor points burned.
- d) Primary coil circuit open or loosely connected.





Continued on next page

(Cont.)



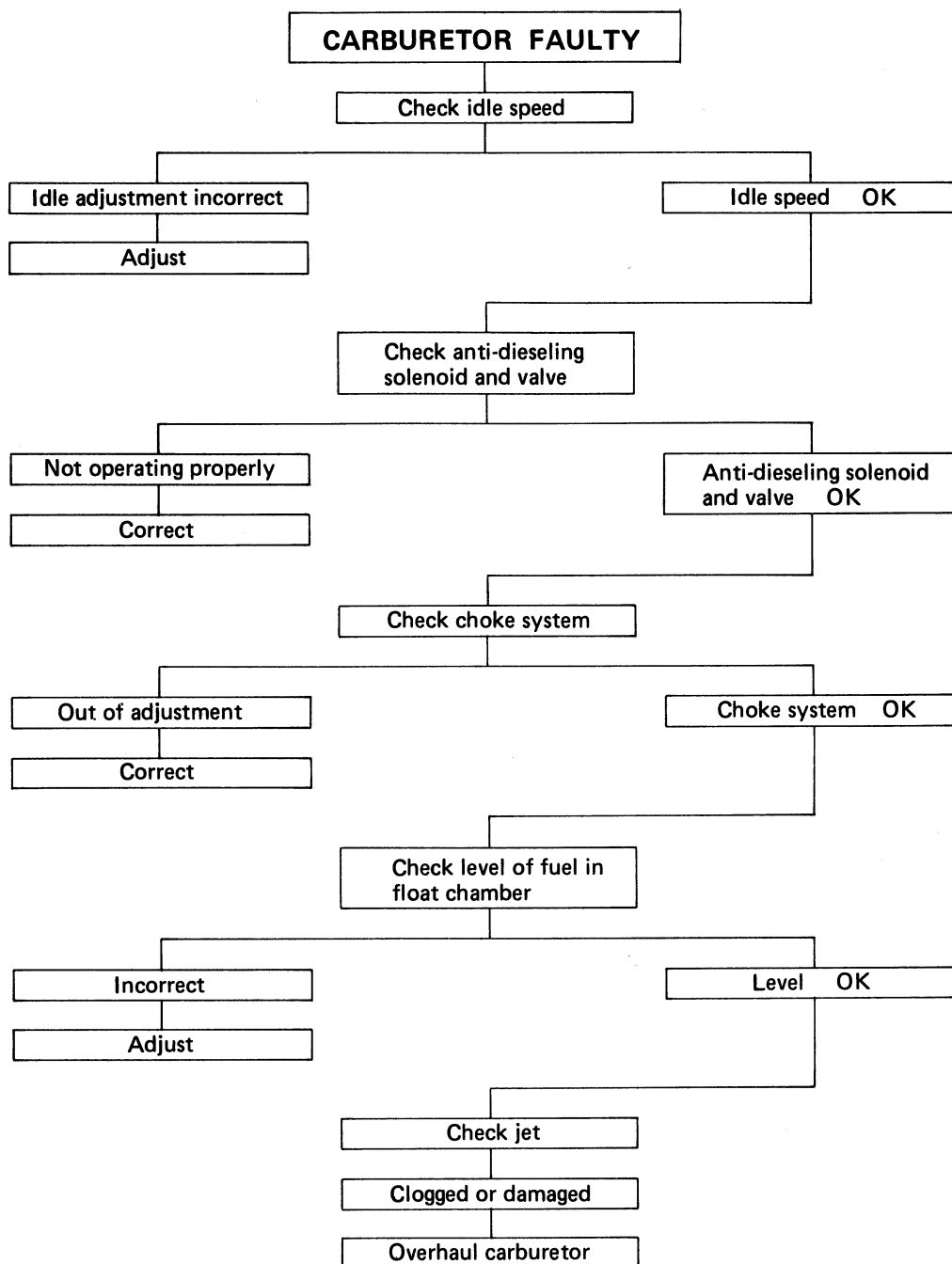
Trouble Shooting Procedure

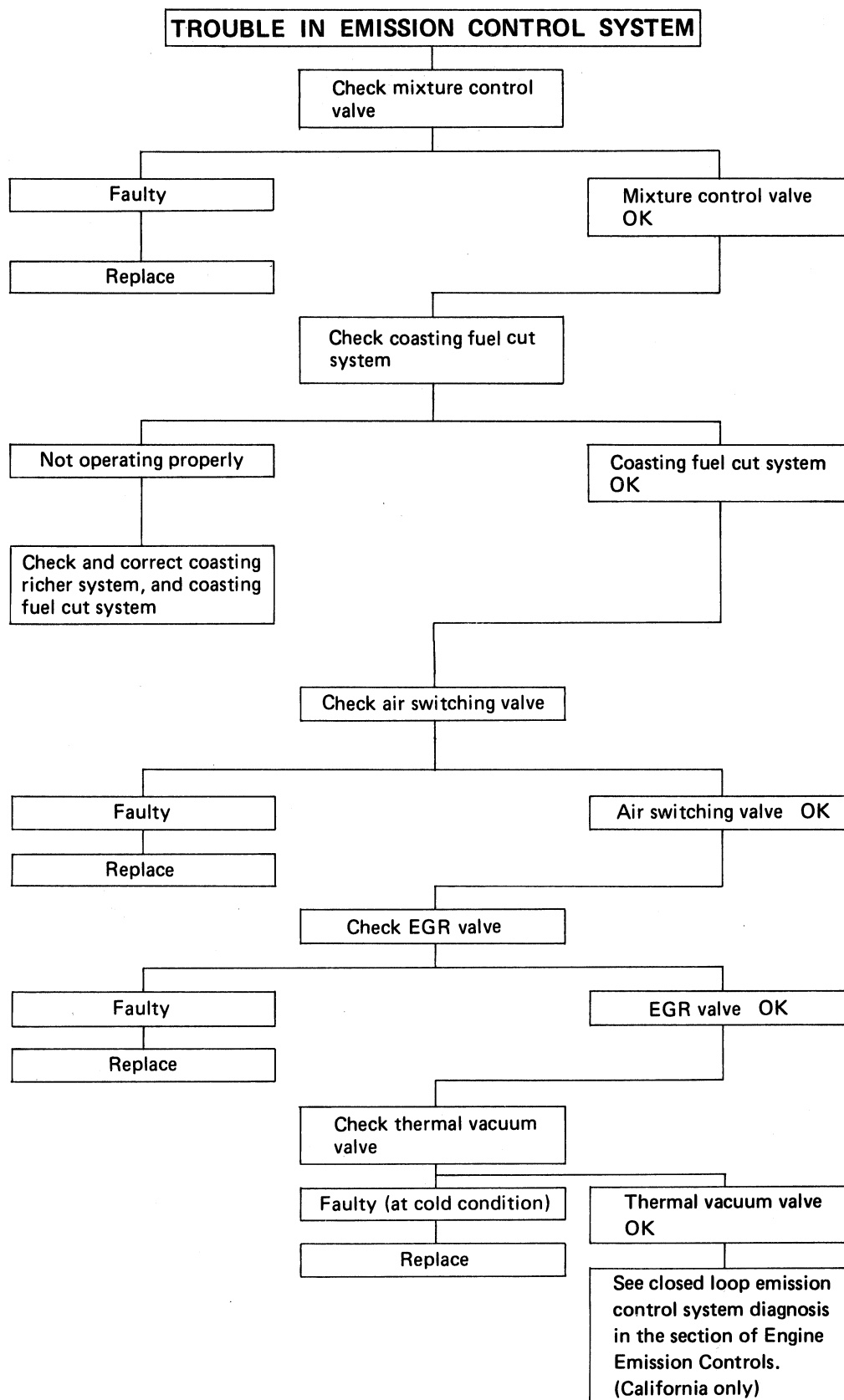
- a) Start and warm up the engine. Remove all spark plugs and apply a few drops of engine oil to the spark plug holes.
- b) Connect a tachometer and crank the engine, checking that the cranking speed is 300 rpm or higher.
- c) Press the adapter of the cylinder compression gauge onto a spark plug hole hard enough to prevent air leakage.
Crank the engine with the throttle valve wide open and take the highest reading of the compression gauge.
- d) Note the reading of the tachometer and the compression gauge.

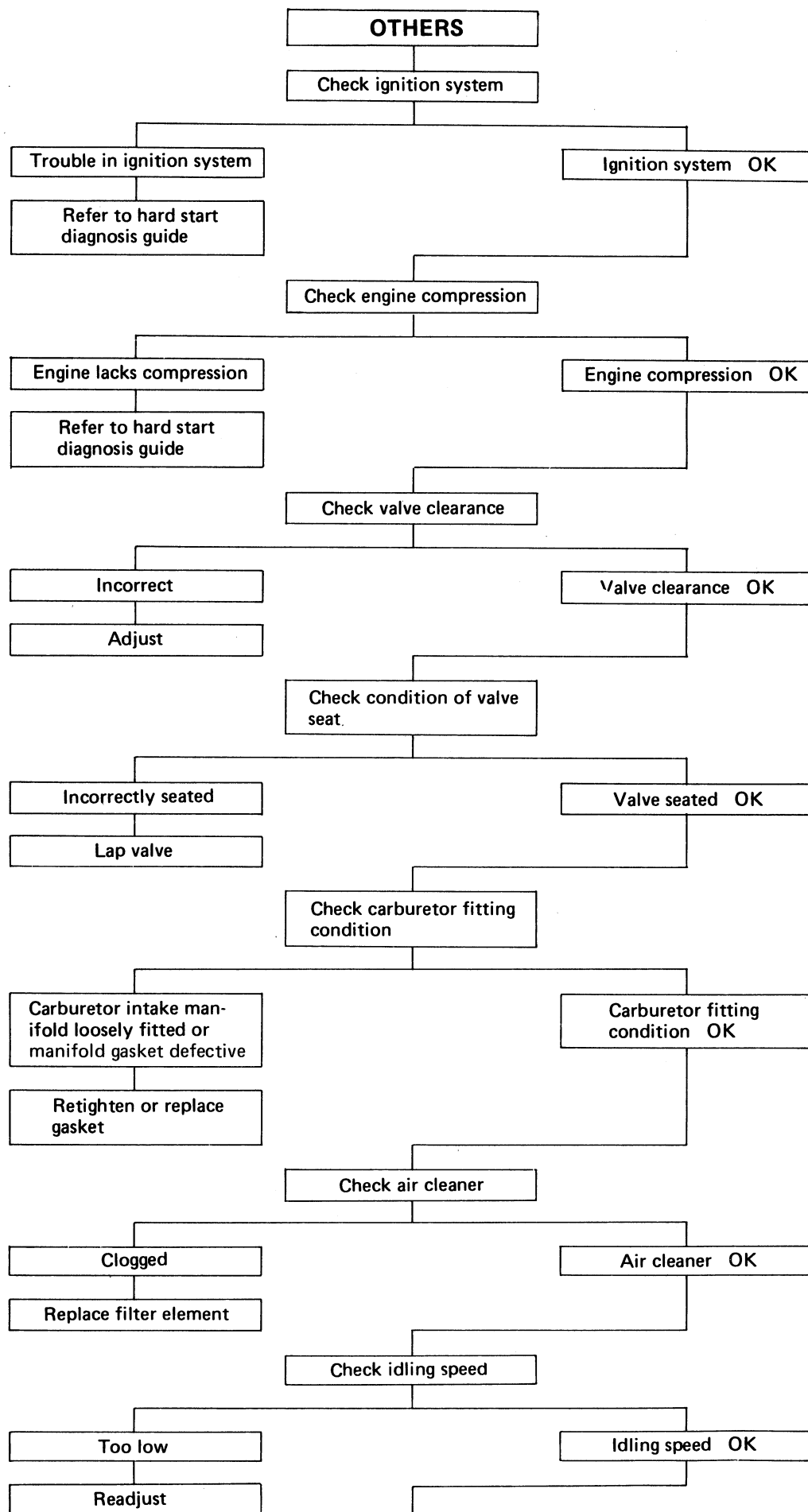


- e) Check the compression in each cylinder by repeating the above procedure. If the variation between cylinders is more than 0.6 kg/cm² (8.53 psi.), perform a cylinder leakage test to determine the cause.

ROUGH ENGINE IDLING







Continued on next page

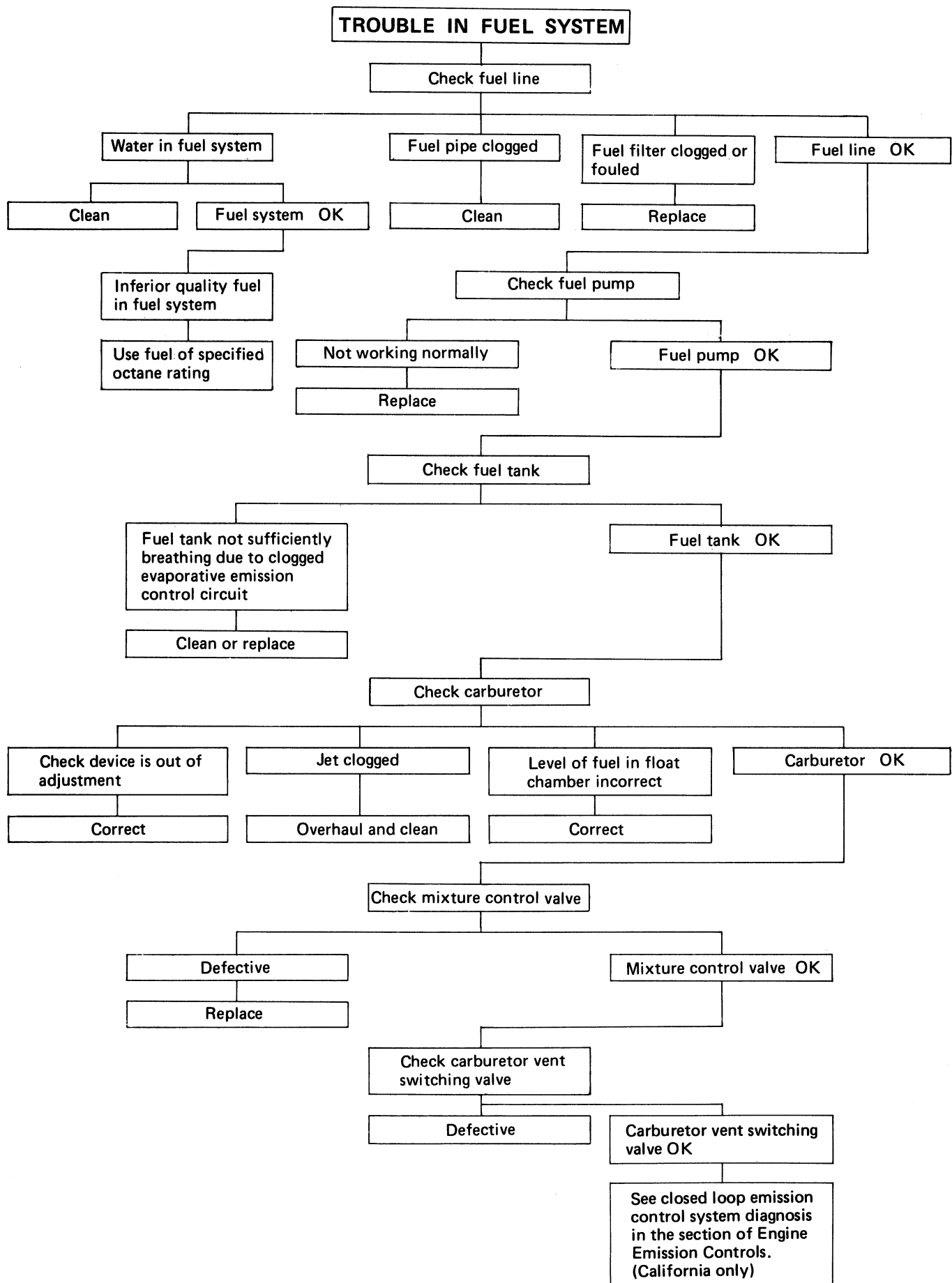
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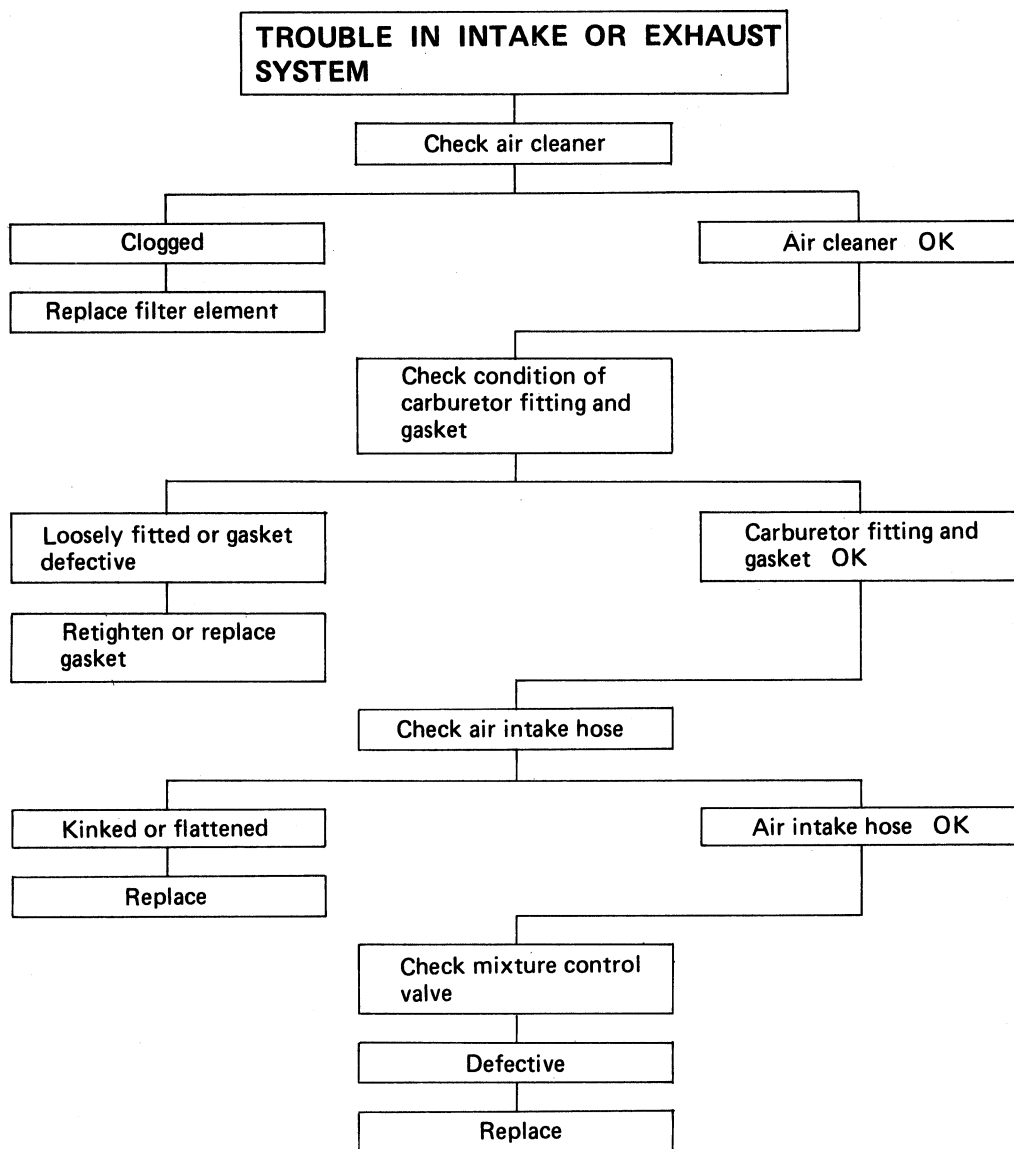
Check camshaft timing

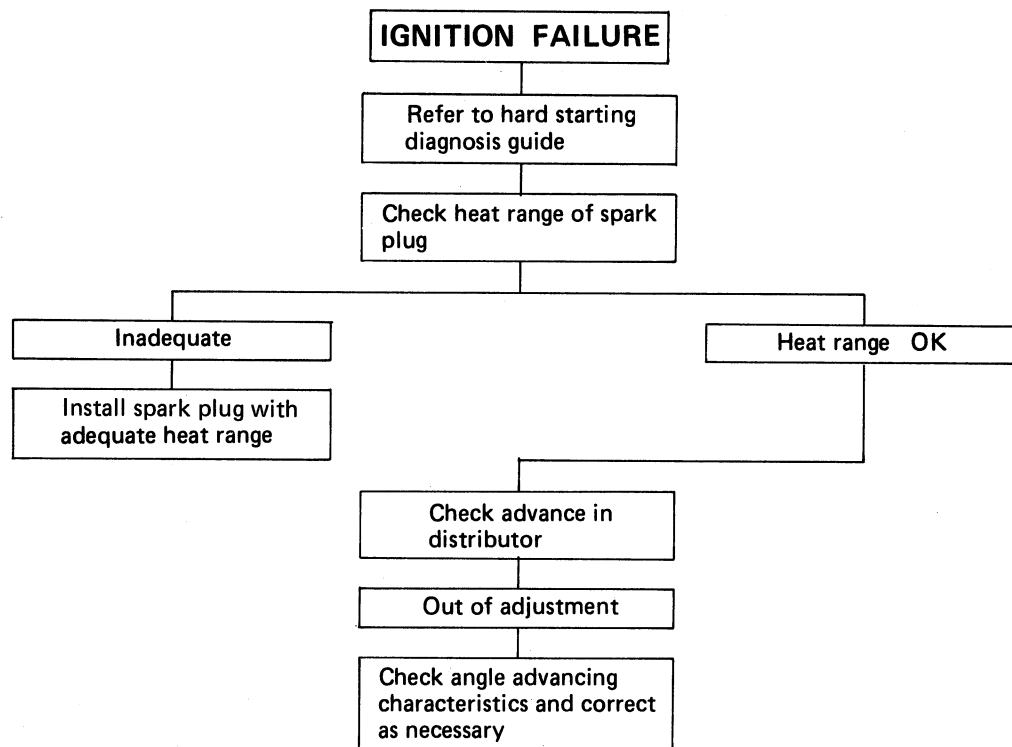
Incorrect

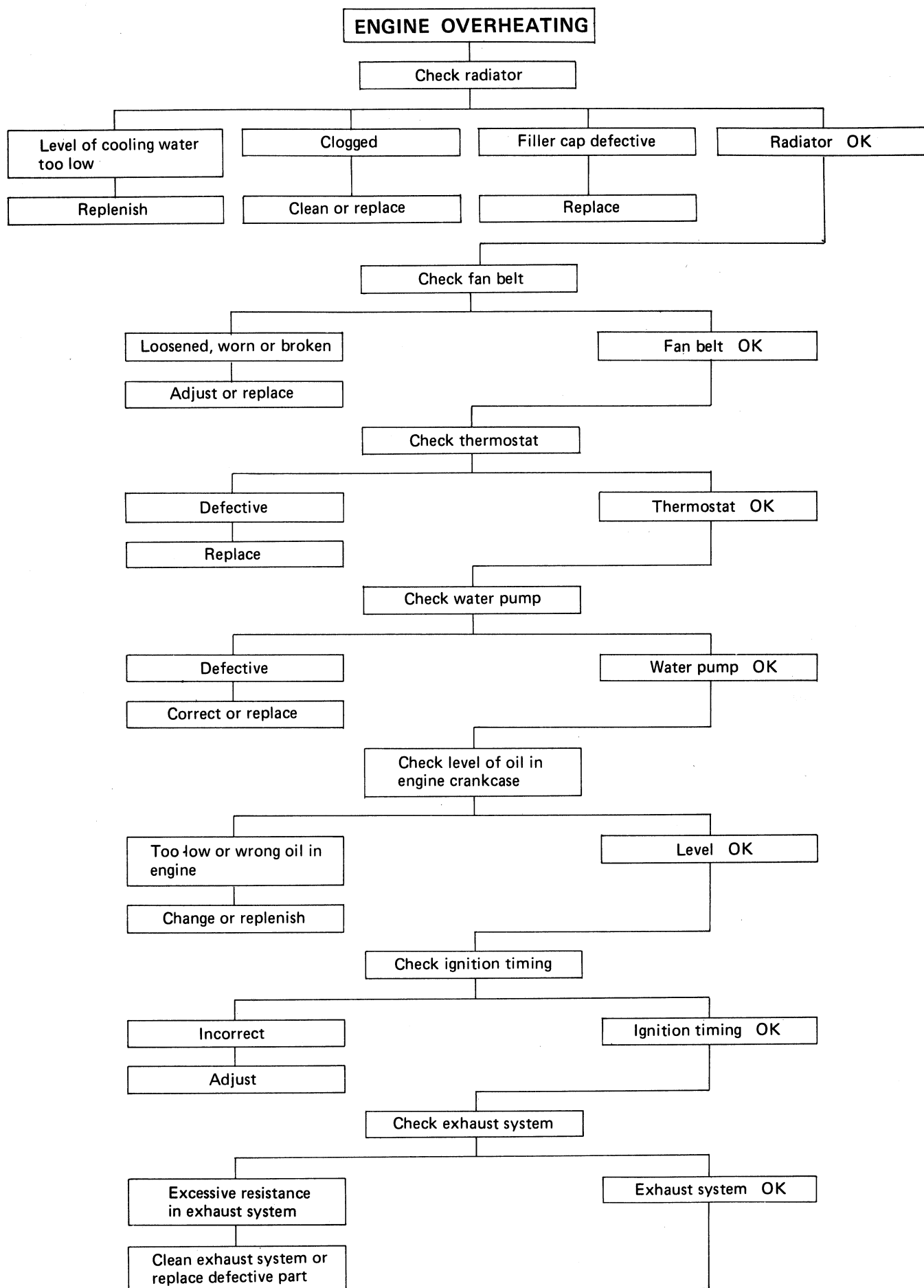
Readjust

ENGINE LACKS POWER



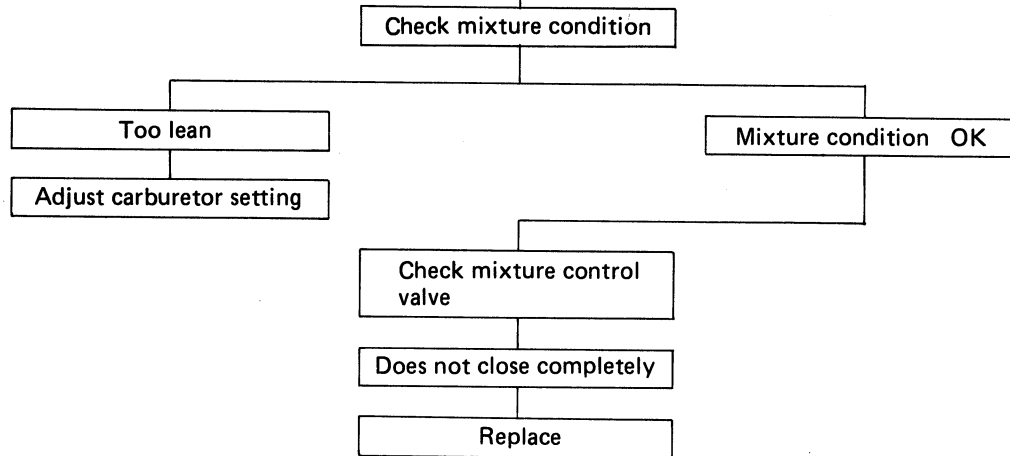
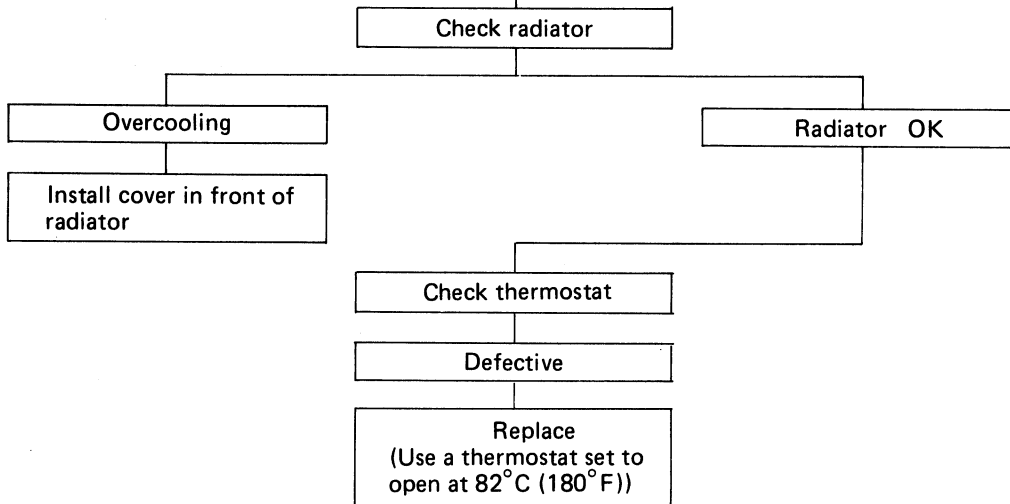






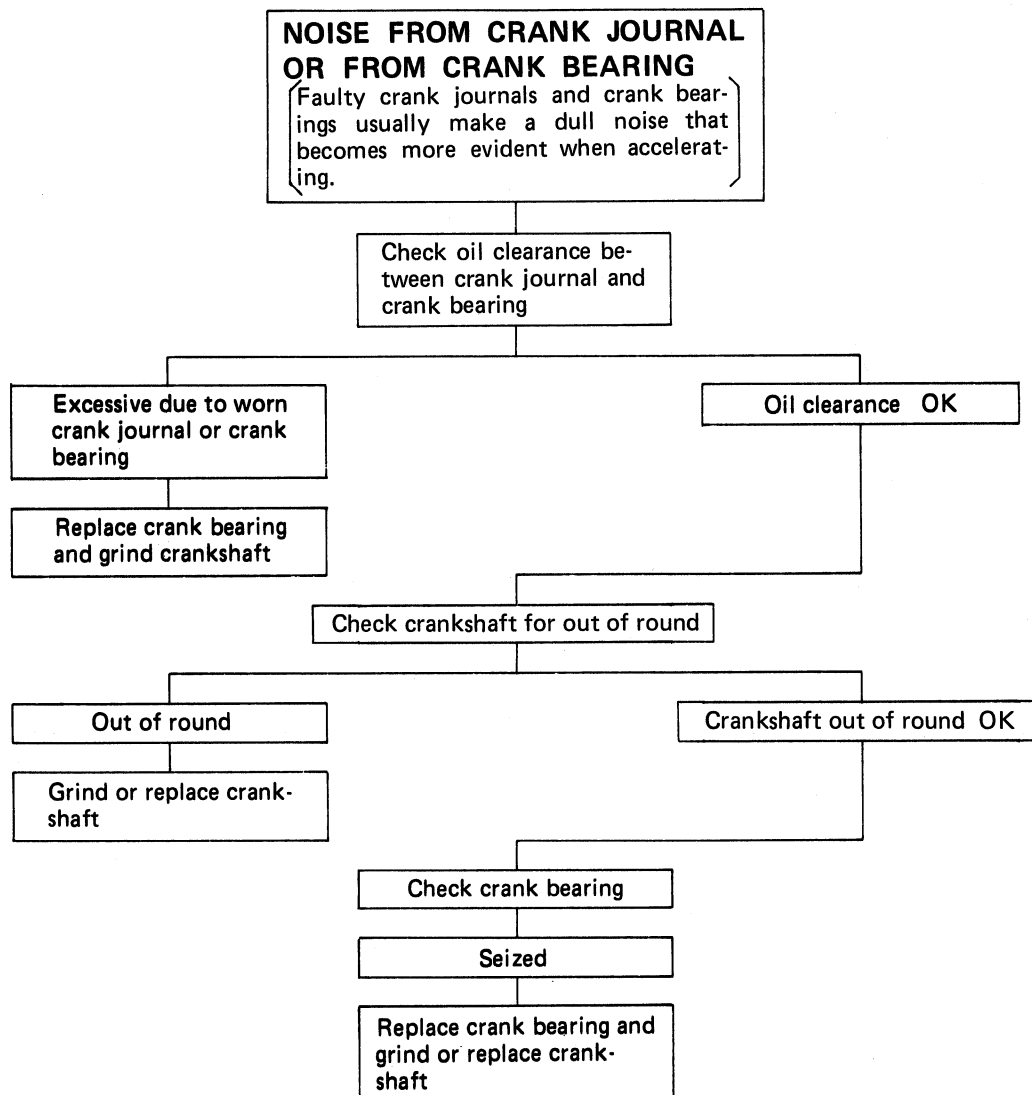
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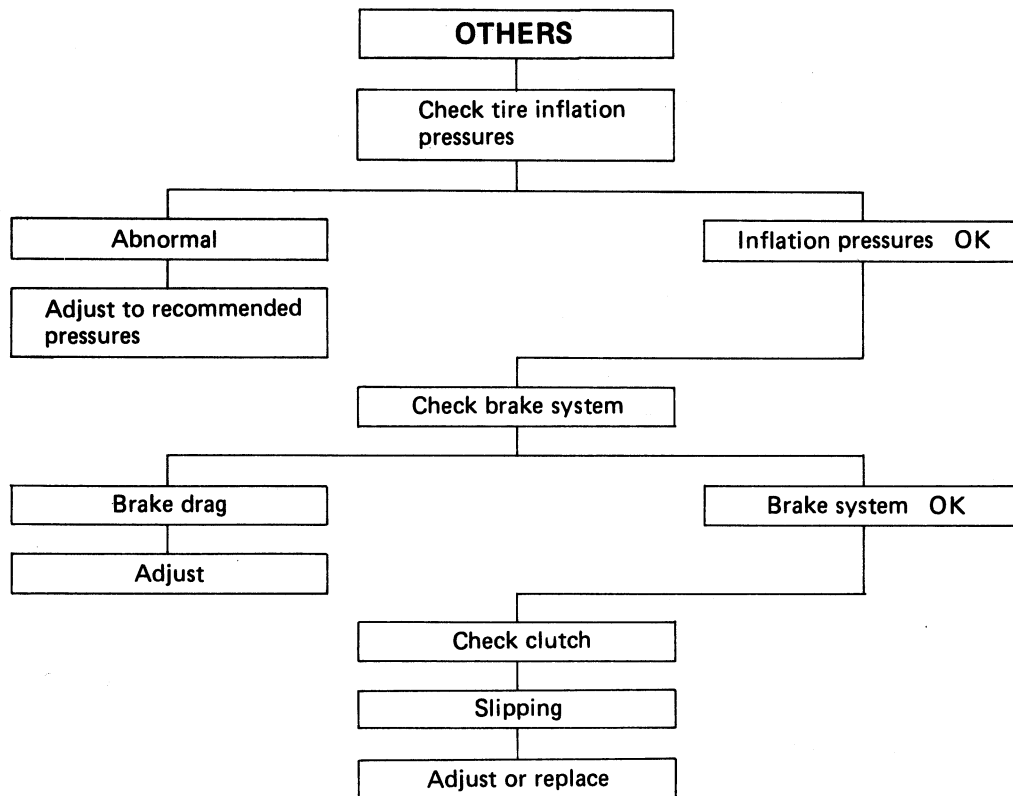
**ENGINE OVERCOOLING****ENGINE LACKS COMPRESSION**

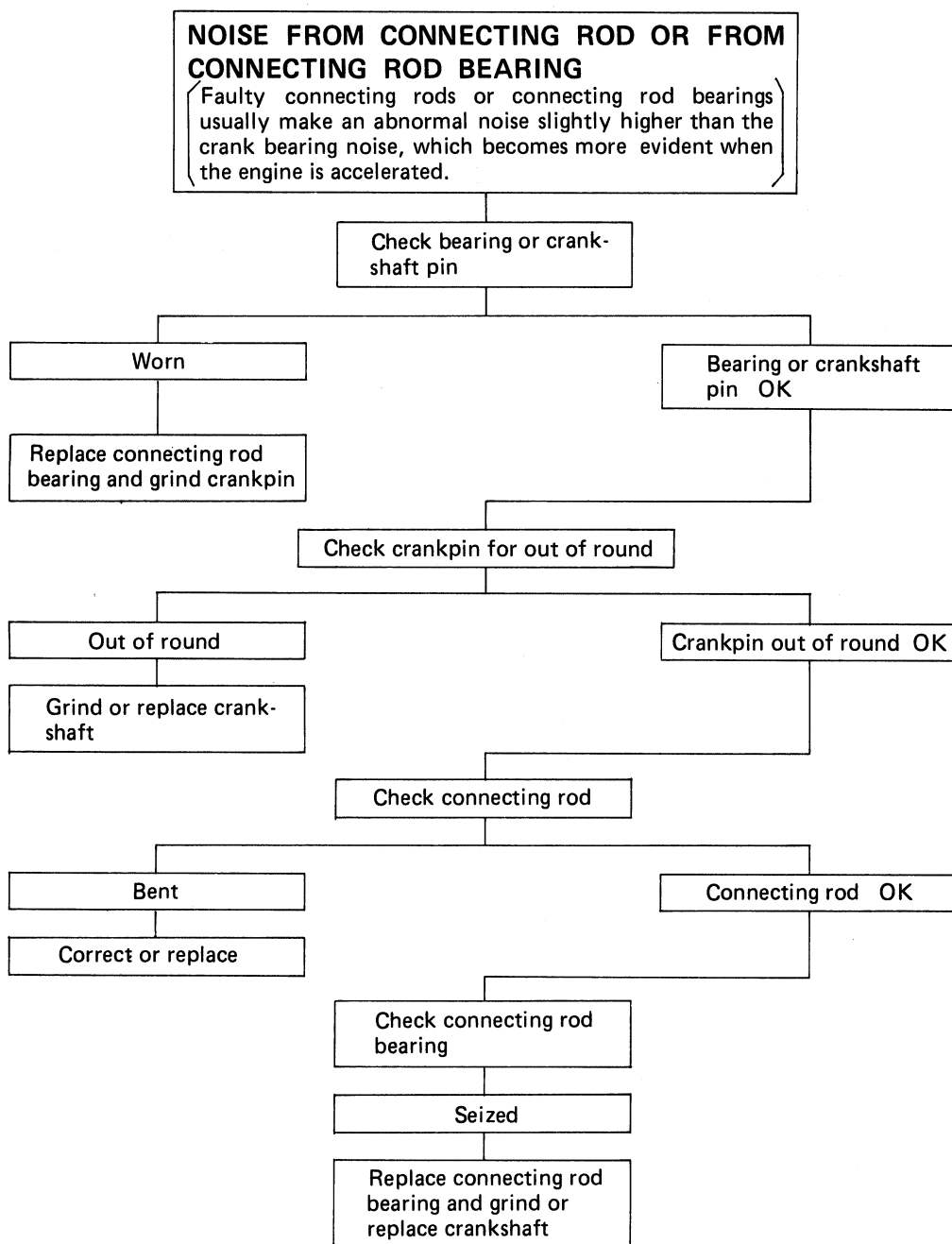
Refer to hard starting diagnosis

ENGINE NOISY

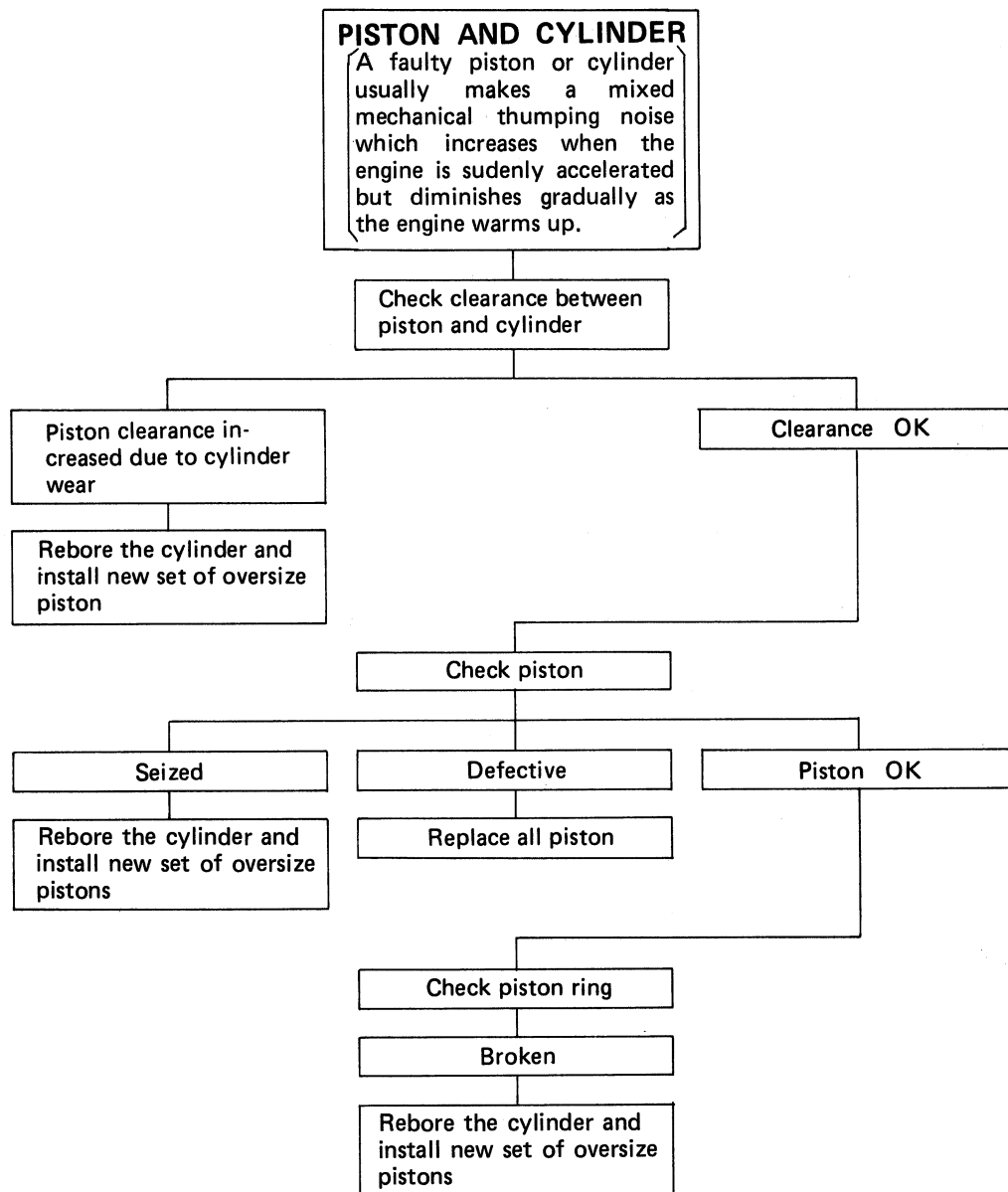
Troubleshooting procedure

Short out each spark plug in sequence with a screwdriver with an insulated handle. Locate the cylinder with the defective bearing by listening for abnormal noise that stops when the spark plug is shorted out.



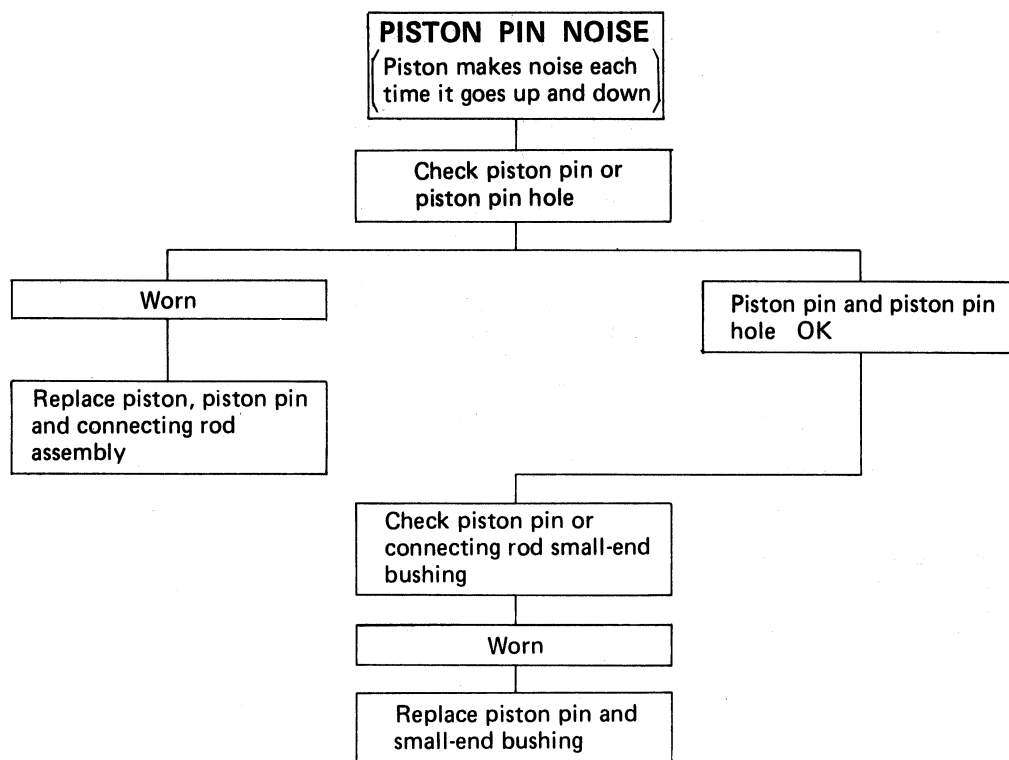
Troubleshooting procedure

Abnormal noise diminishes when the spark plug on the cylinder with defective parts is shorted out.



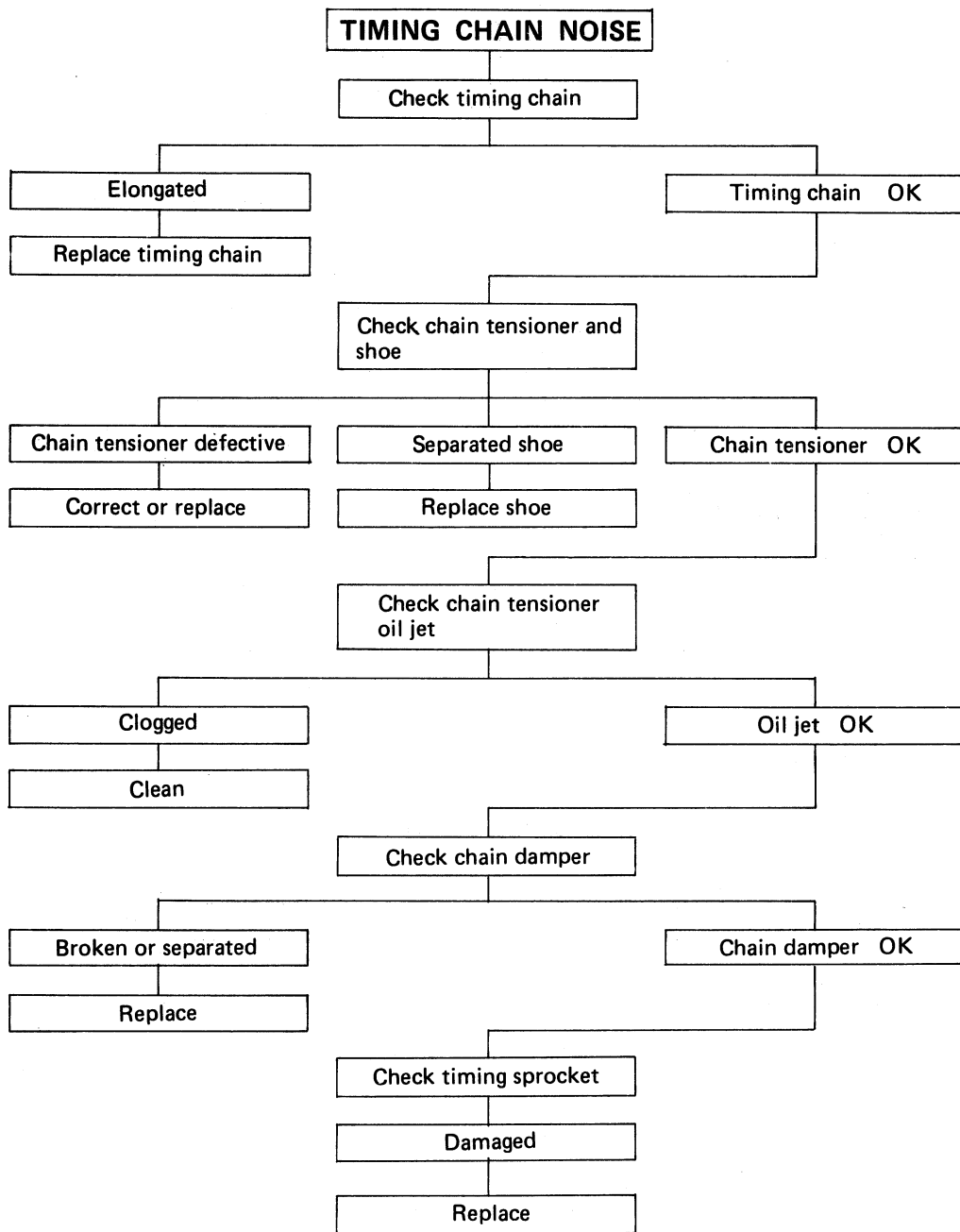
Trouble-shooting procedure

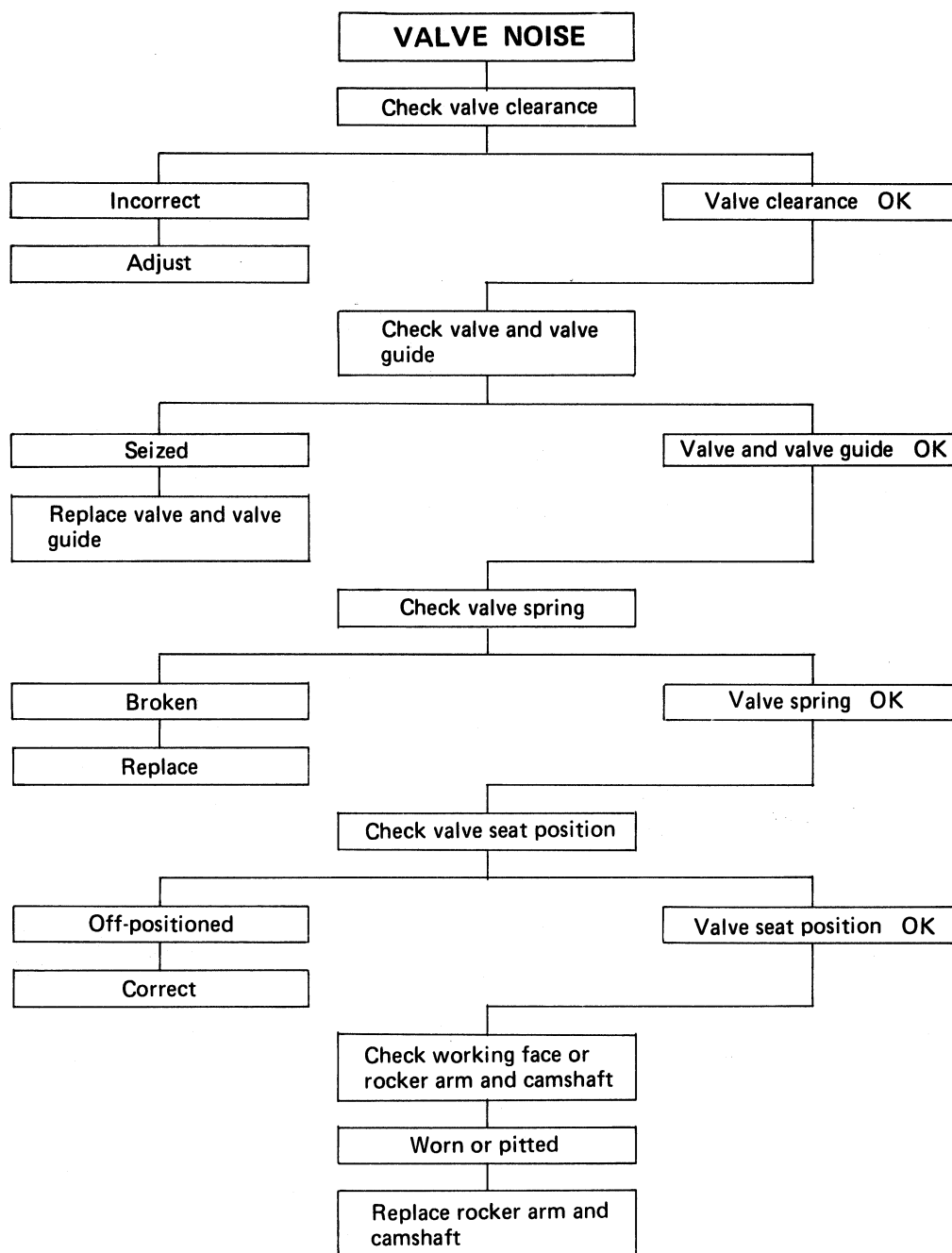
Short out each spark plug and listen for a change in engine noise.

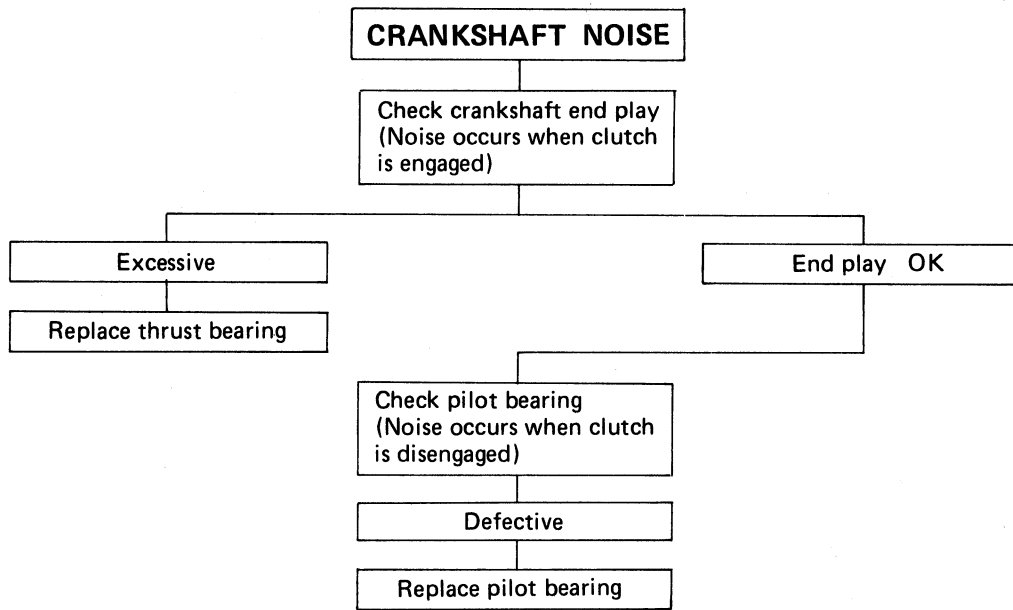


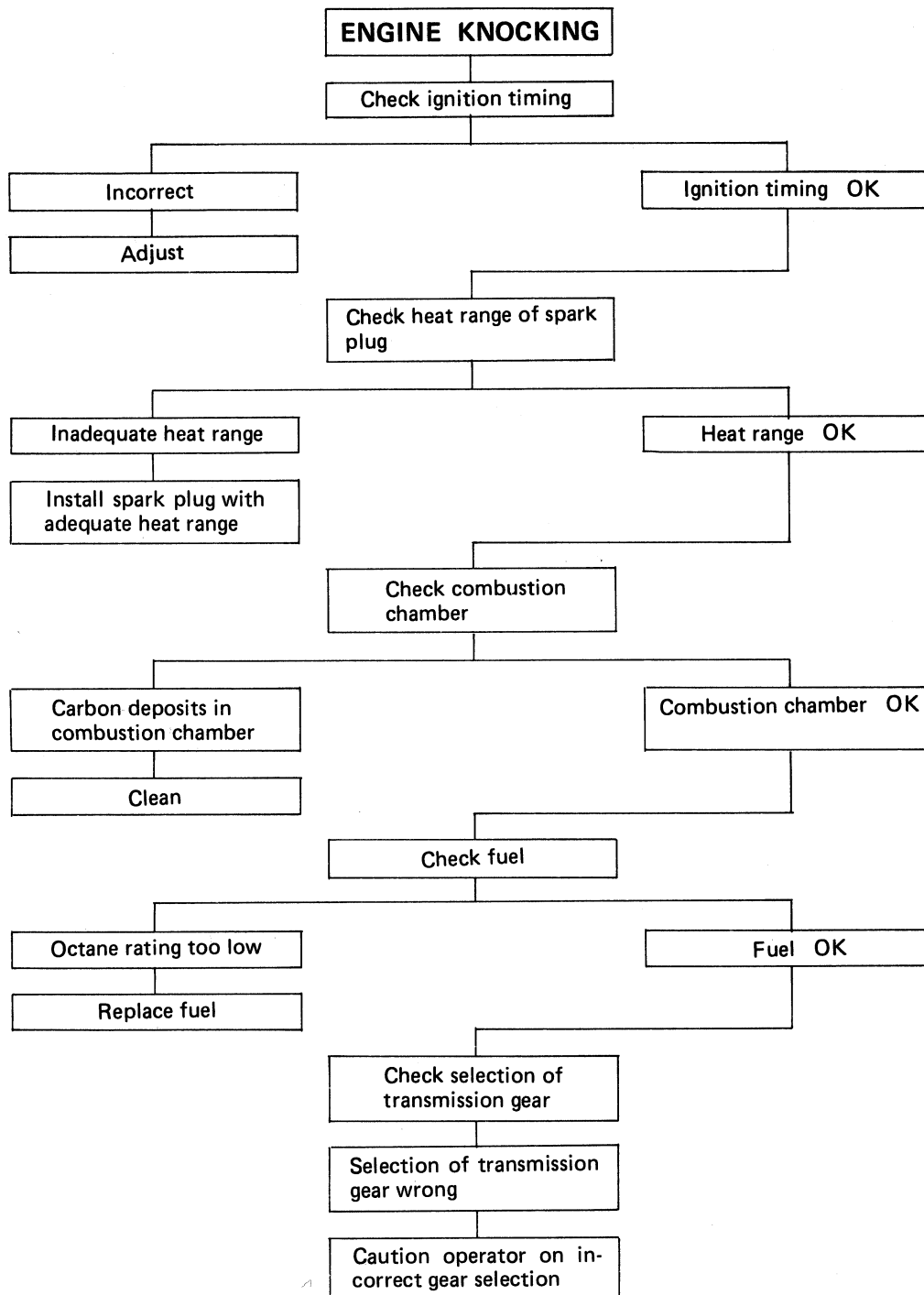
Trouble-shooting procedure

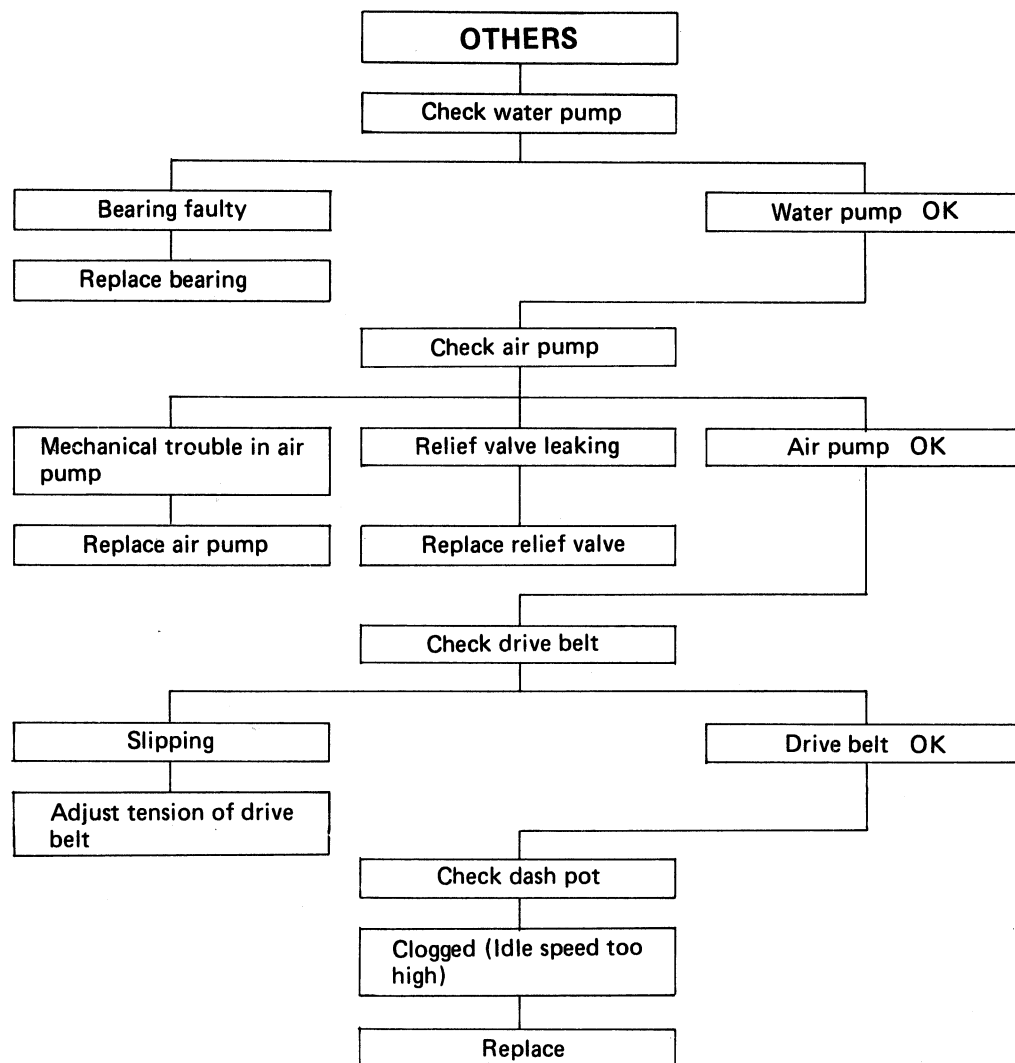
The slapping sound diminishes when the spark plug on the cylinder with trouble is shorted out.



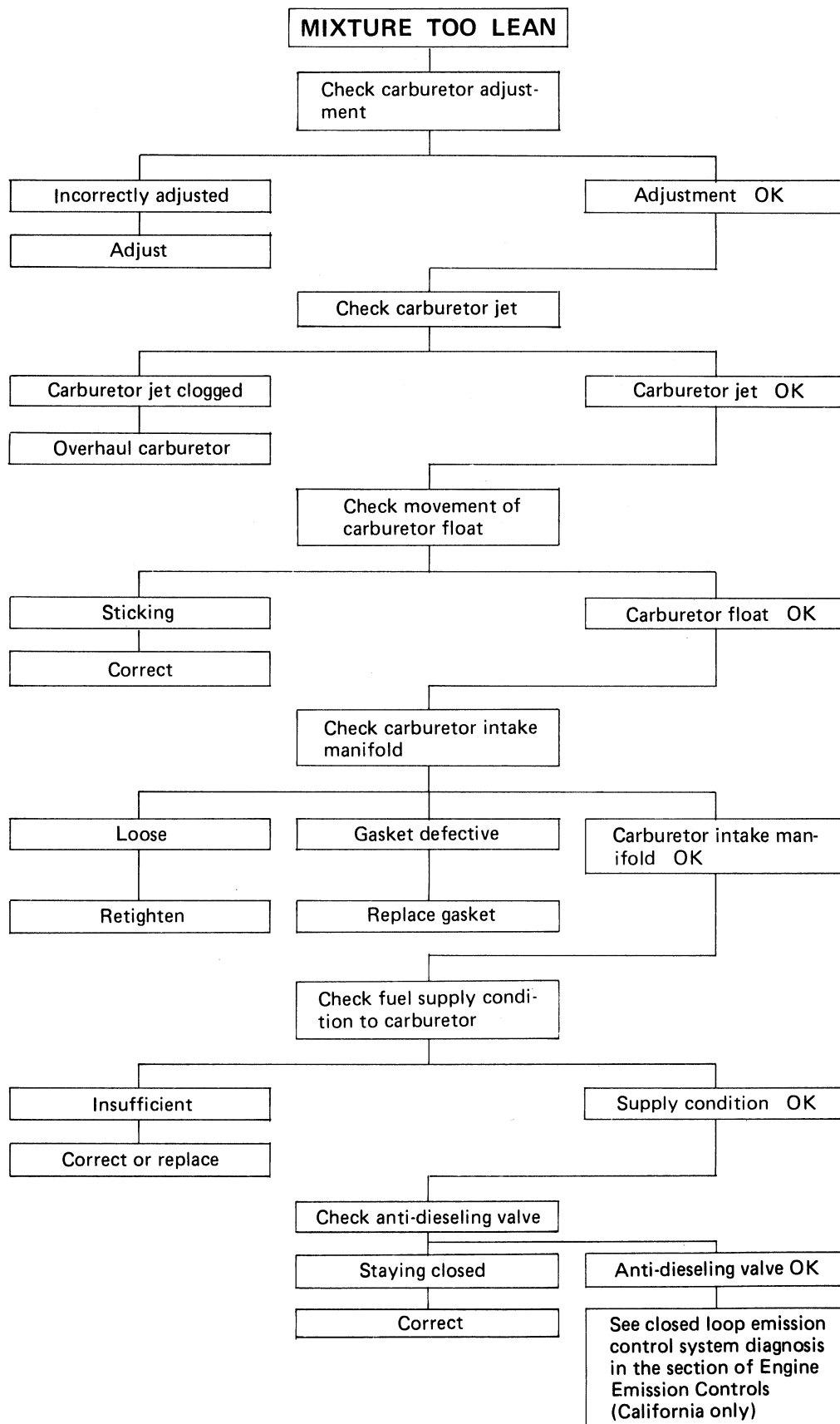


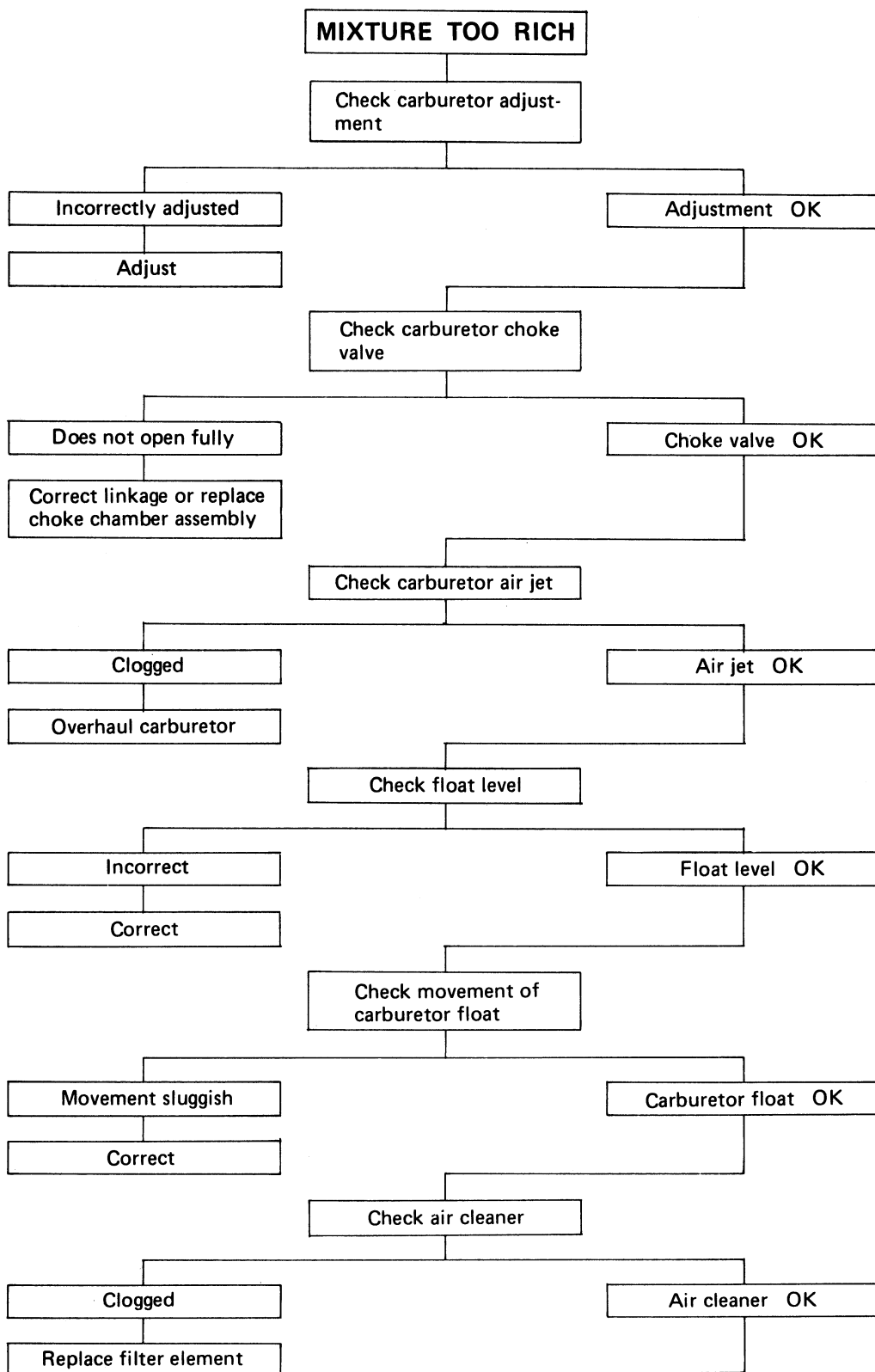






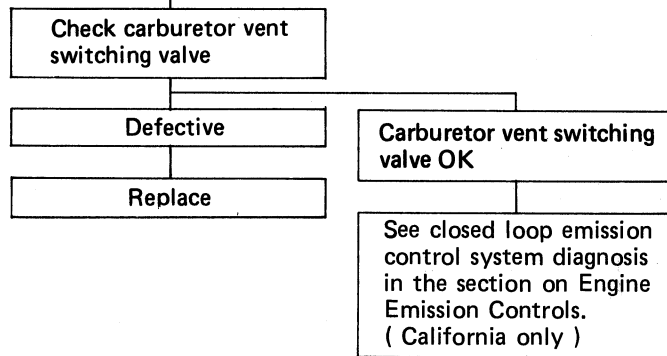
ABNORMAL COMBUSTION



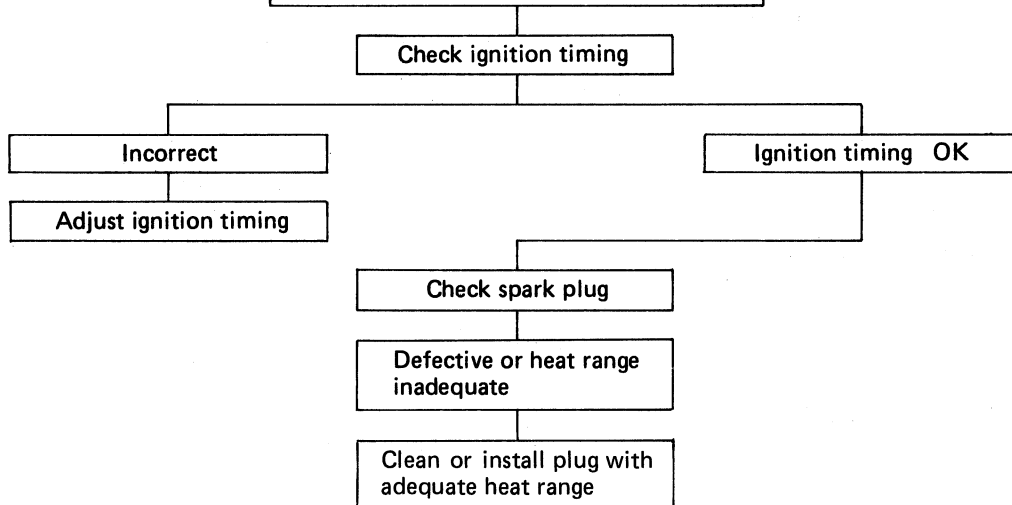


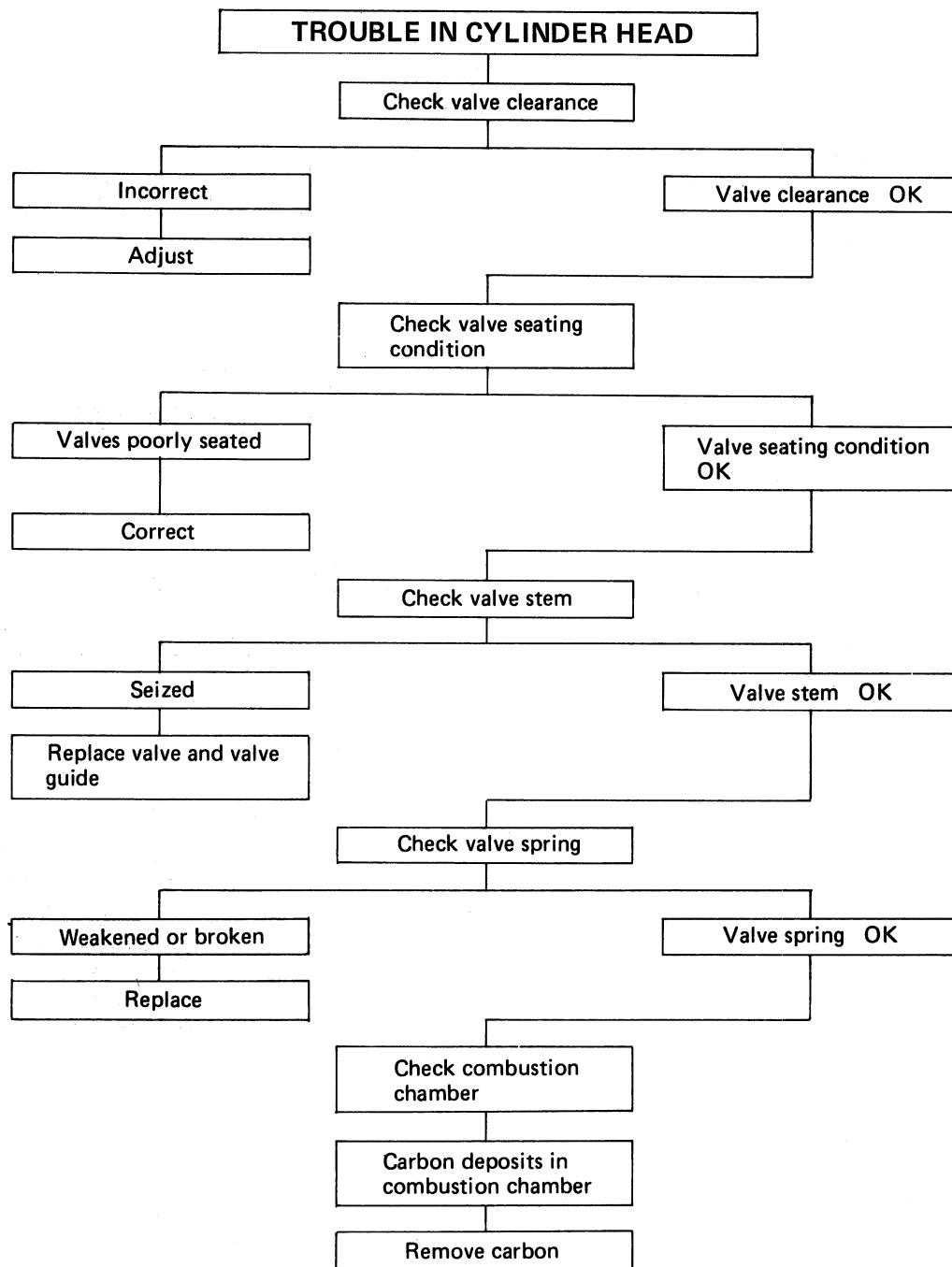
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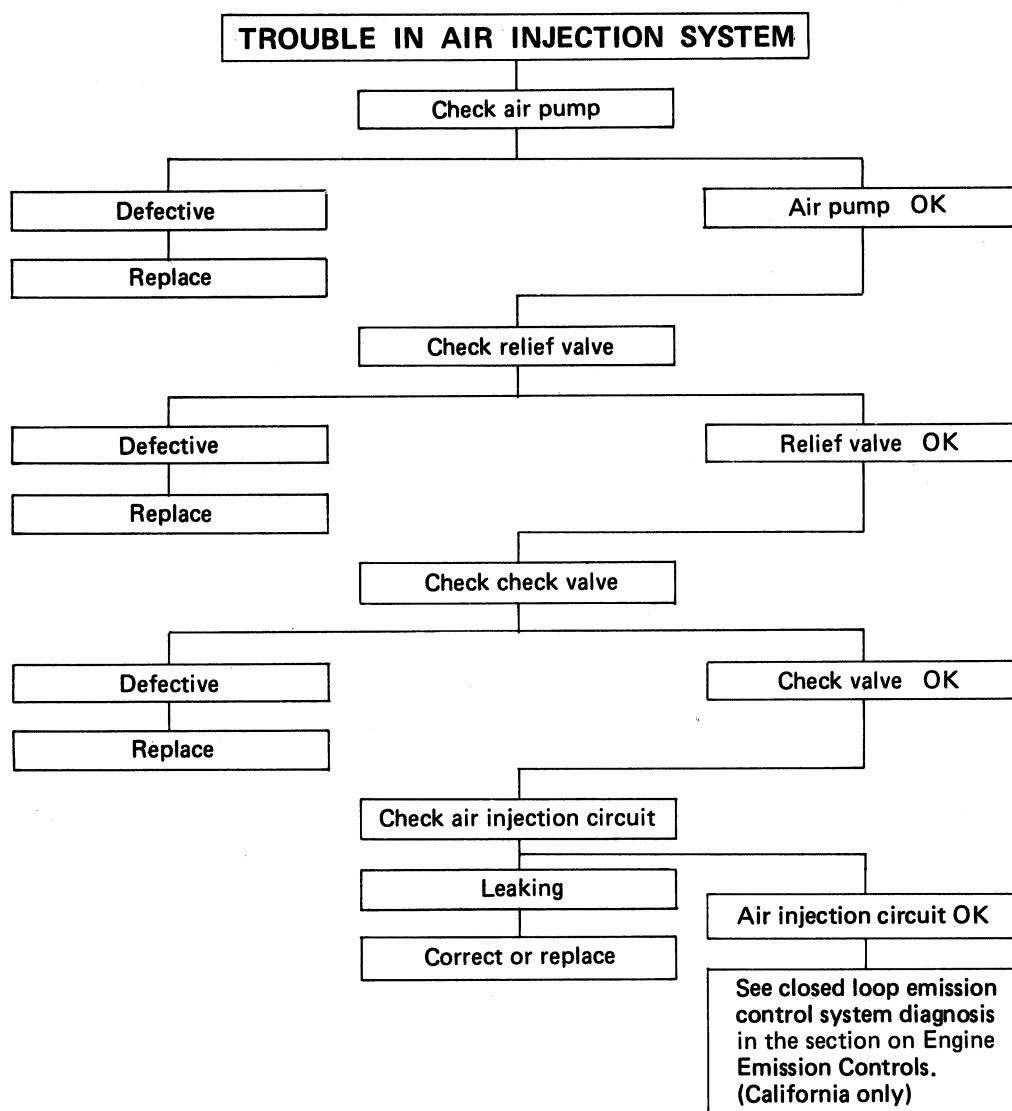
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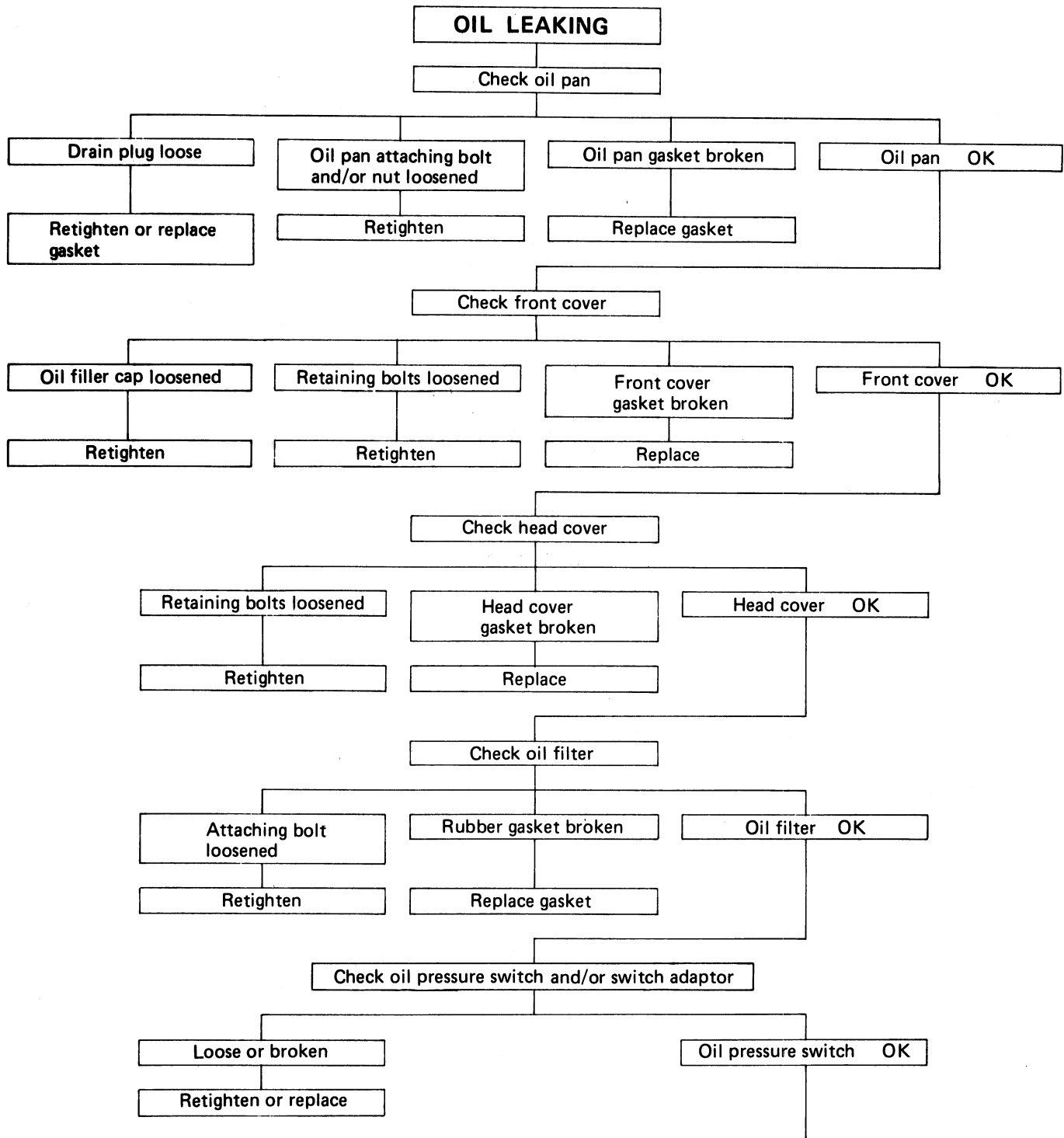
TROUBLE IN IGNITION SYSTEM



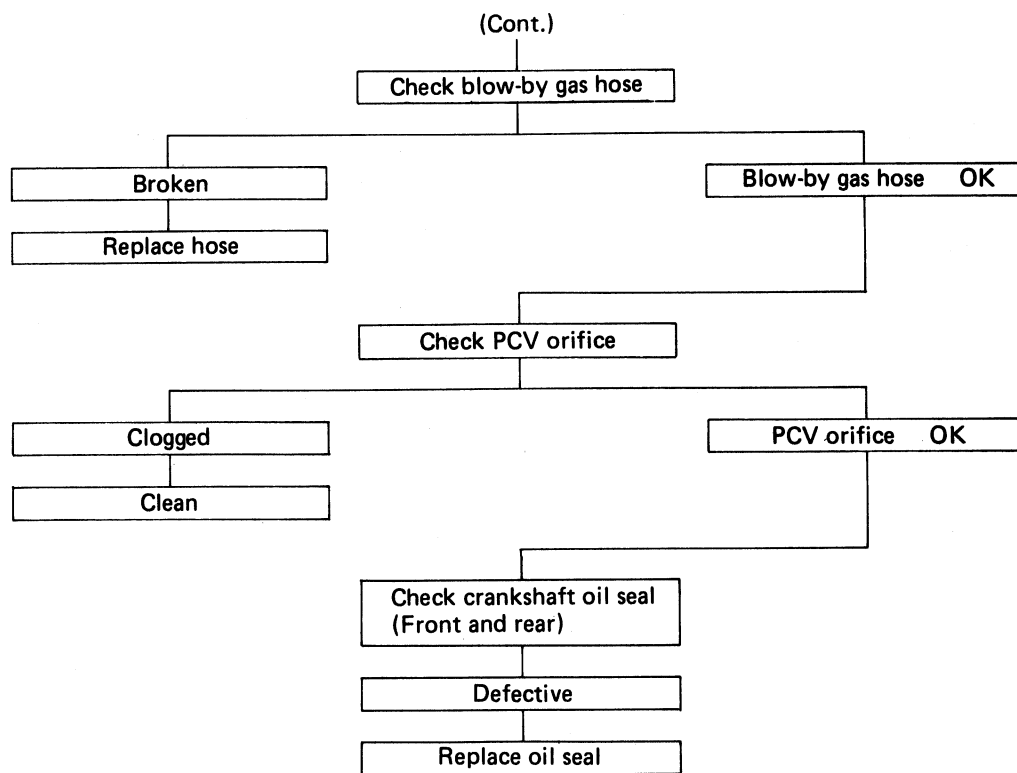


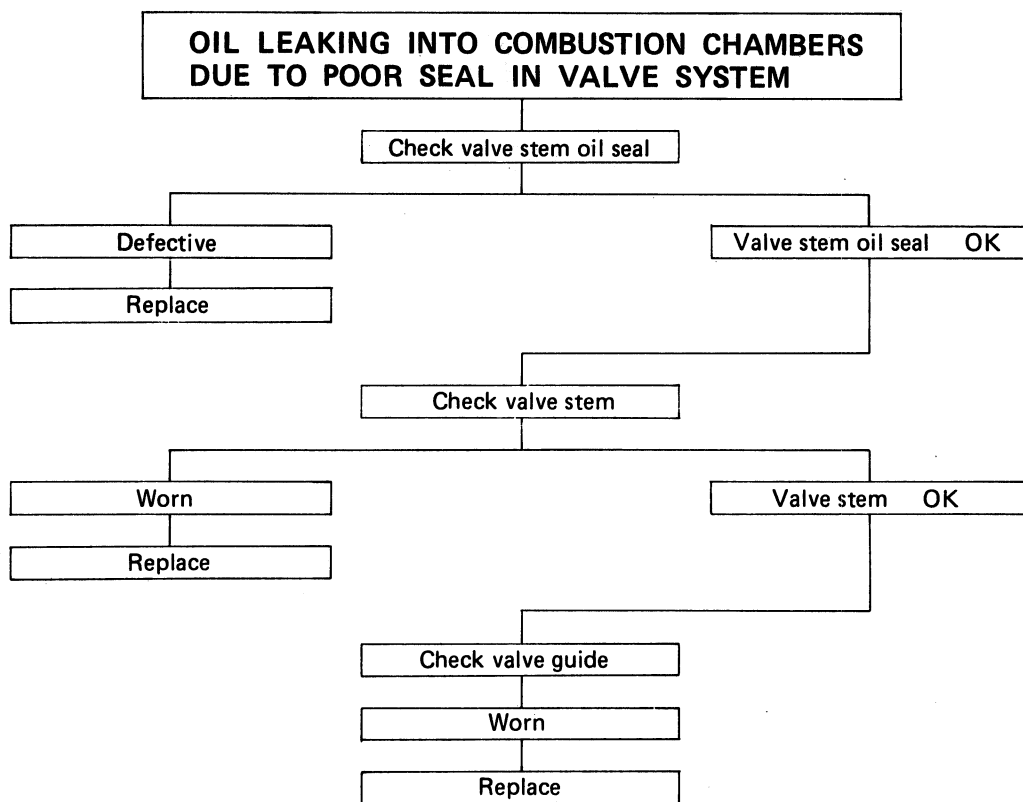


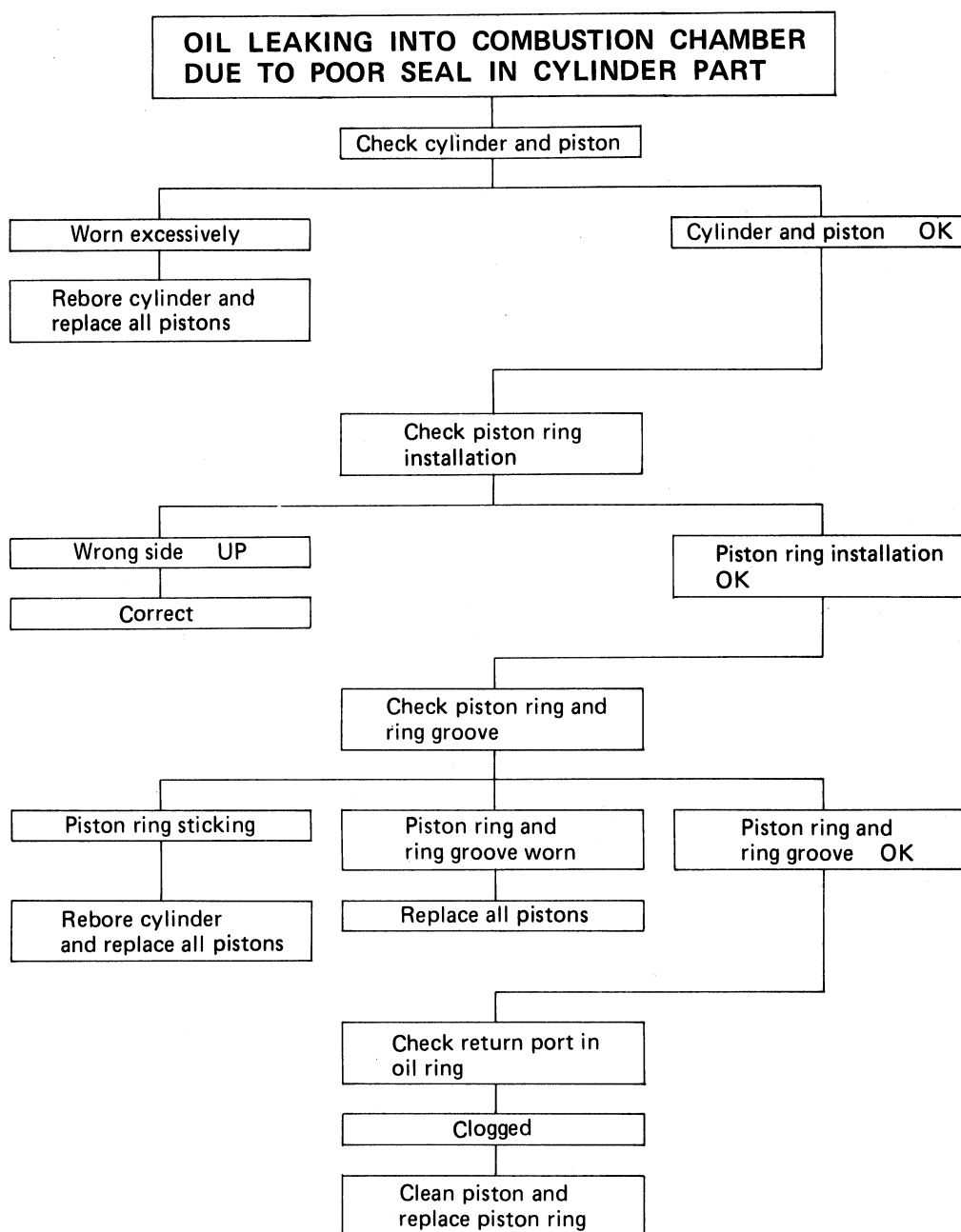
ENGINE OIL CONSUMPTION EXCESSIVE

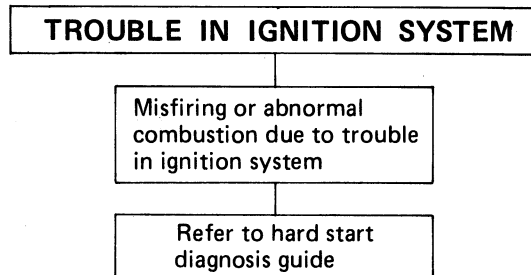
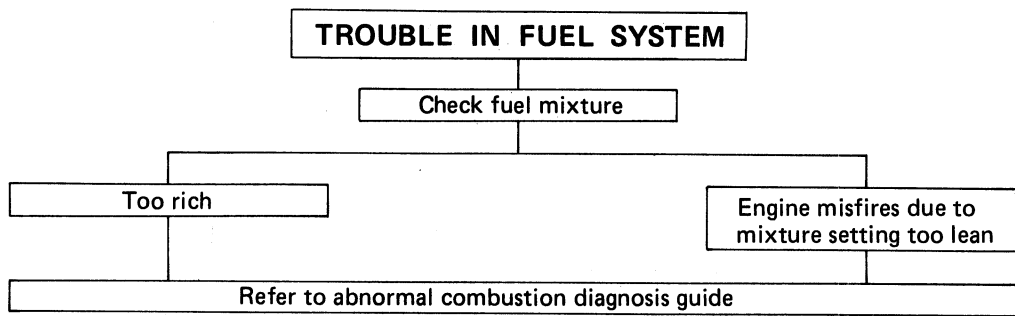


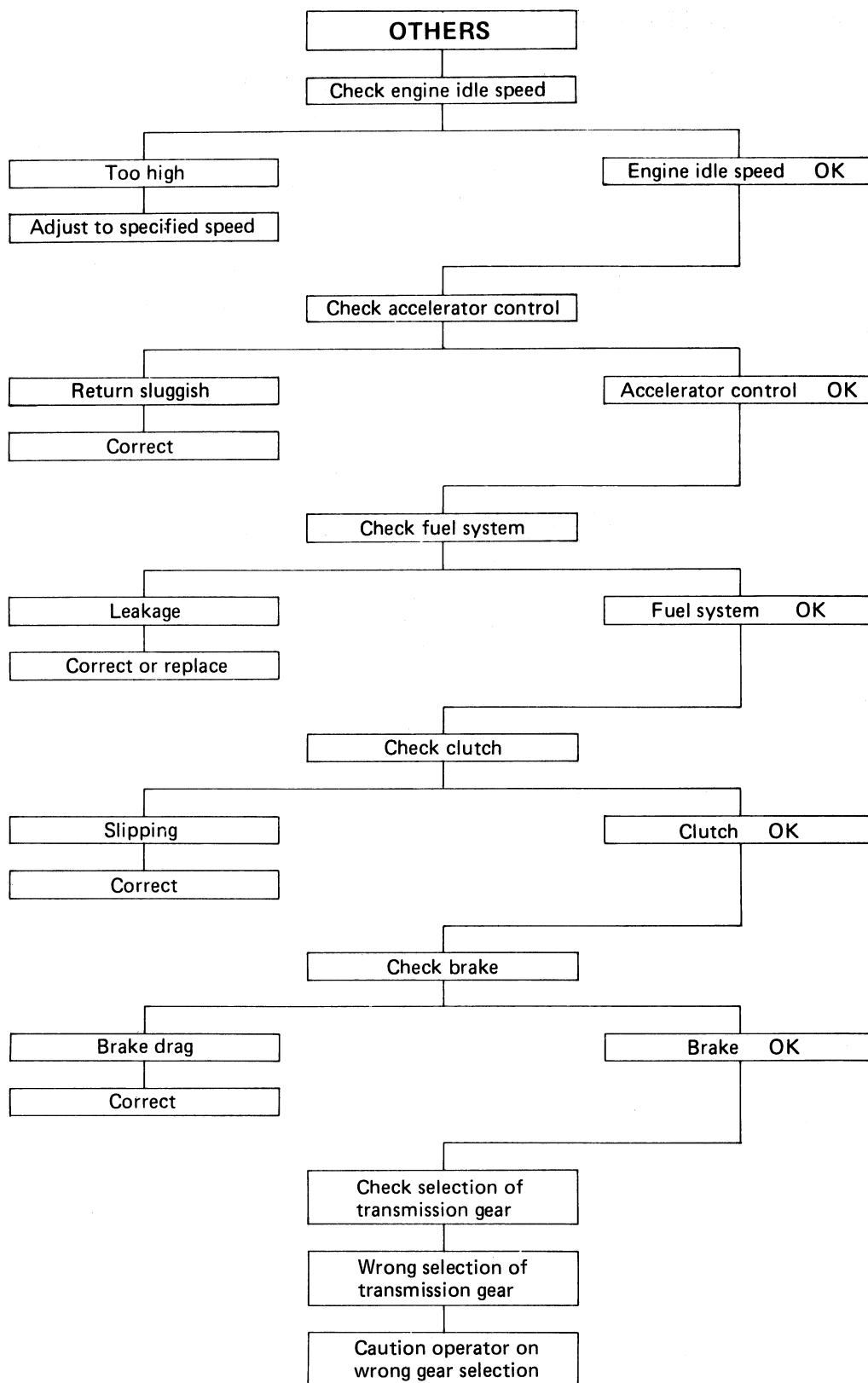
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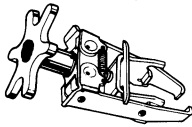
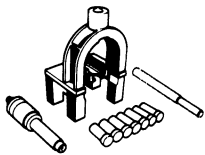
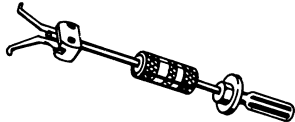
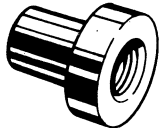
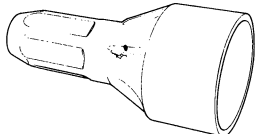




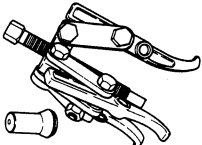
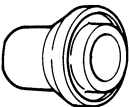
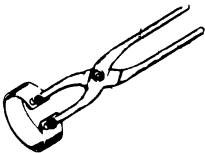
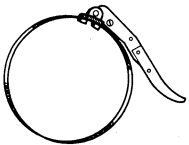
FUEL CONSUMPTION EXCESSIVE



SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-24239-01	Wrench ; head bolt
		J-26513-A	Compressor ; valve spring
		J-26512 J-26512-1 J-26512-2	Remover ; guide pin and installer Adapter ; installer
		J-24086 J-24086-8 J-24086-10 J-33948 J-24086-9 J-24086-5	Service set ; piston pin Remover ; Base fixture Piston support Installer ; Pin guide
		J-23097	Remover ; pilot bearing
		J-26516-A	Installer ; pilot bearing
		J-29036	Installer ; sleeve
		J-22928-A	Installer ; oil seal, rear

01—118 GASOLINE ENGINE

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-25031	Remover ; timing wheel crankshaft
		J-26587	Installer ; oil seal front cover
		J-8037	Setting tool
		J-22700	Wrench ; oil filter
		J-24460-1	Tester ; radiator cap

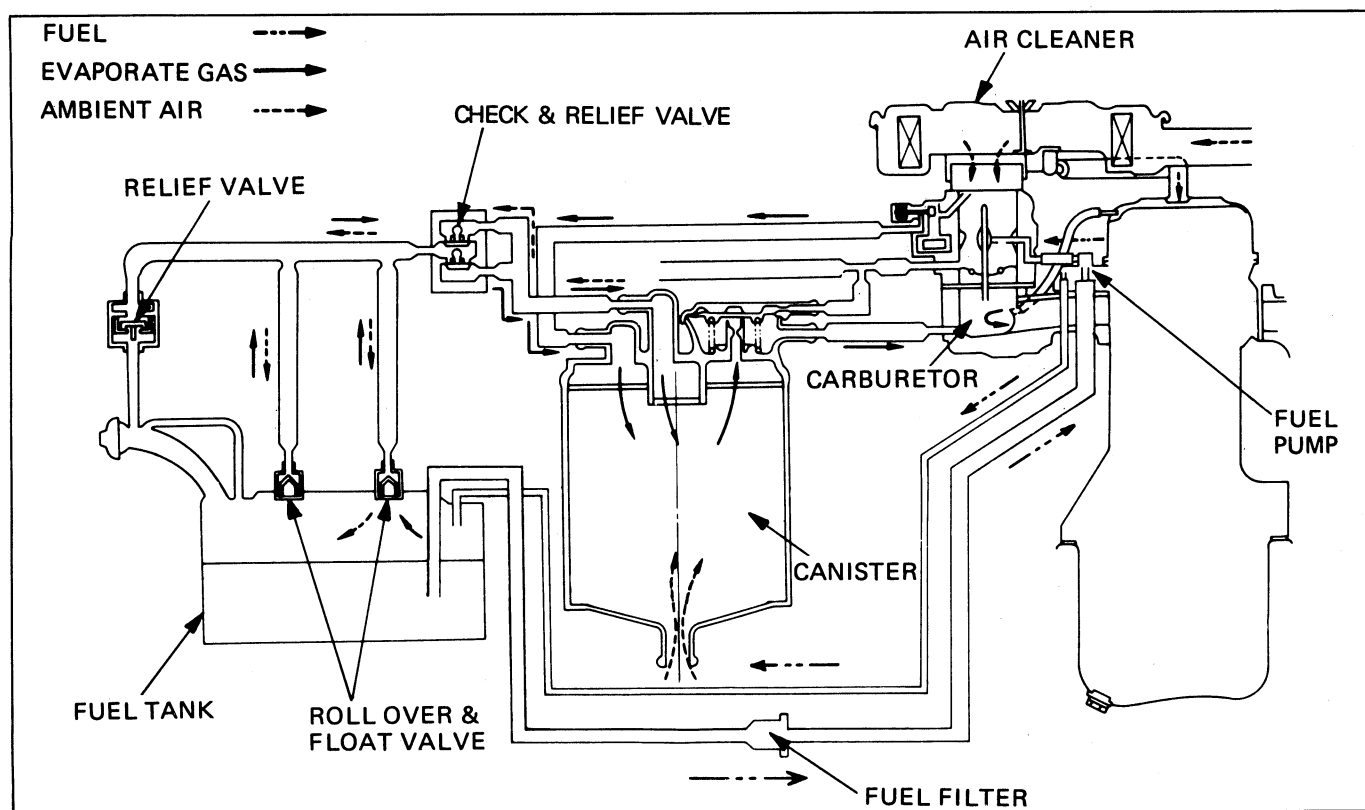
SECTION 02

FUEL SYSTEM

INDEX

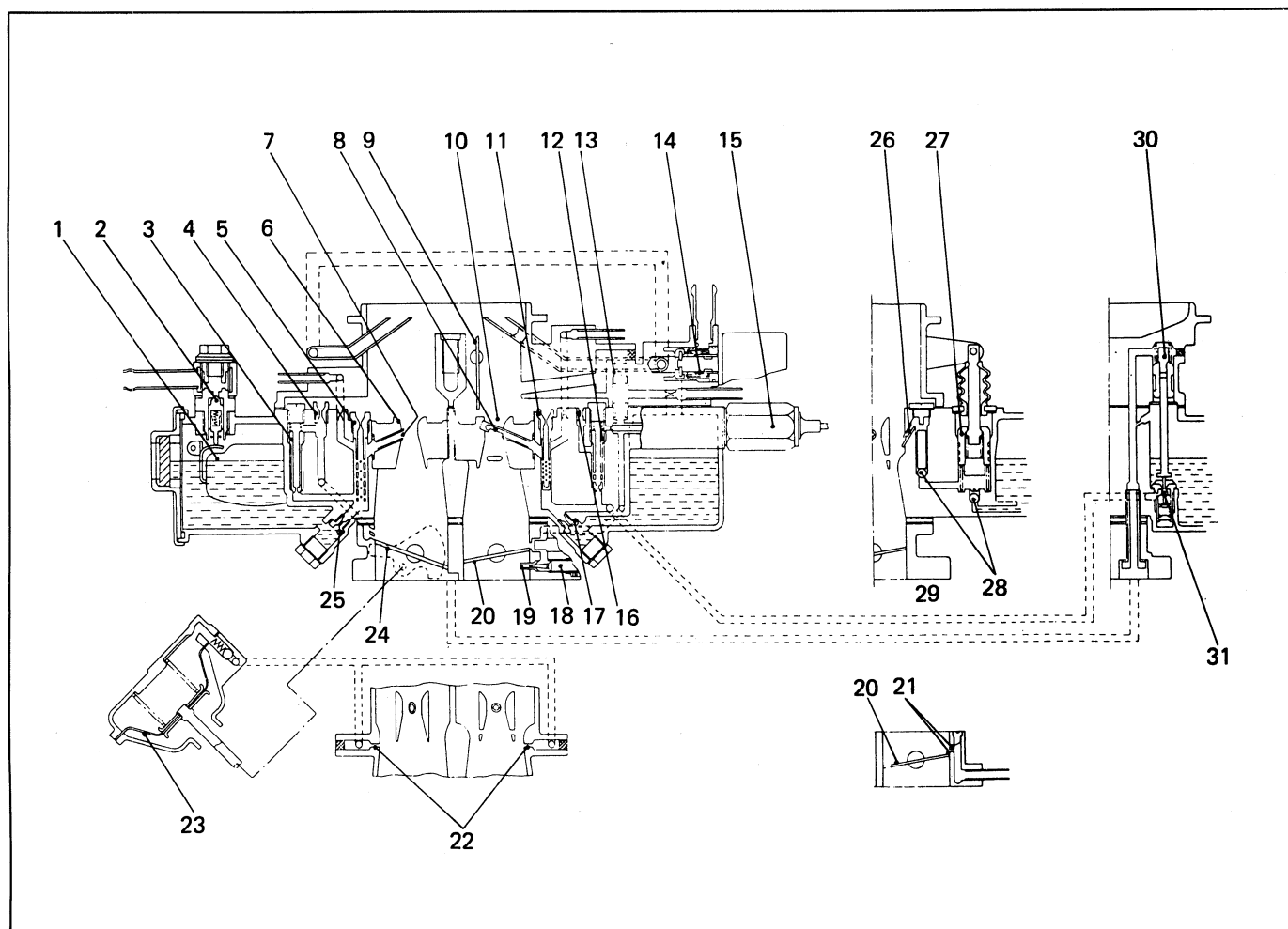
CONTENTS	PAGE
General description	02- 1
Main data and specifications	02- 6
Major parts ; fixing nuts and bolts	02- 7
Carburetor	02- 8
Fuel filter	02-20
Fuel pump	02-21
Fuel tank	02-22
Diagnosis	02-26

GENERAL DESCRIPTION



CARBURETOR (TWO BARREL-DOWN DRAFT)

This is a two-barrel, down draft type carburetor. The low speed primary side and the high speed secondary side are integrated into a single unit.

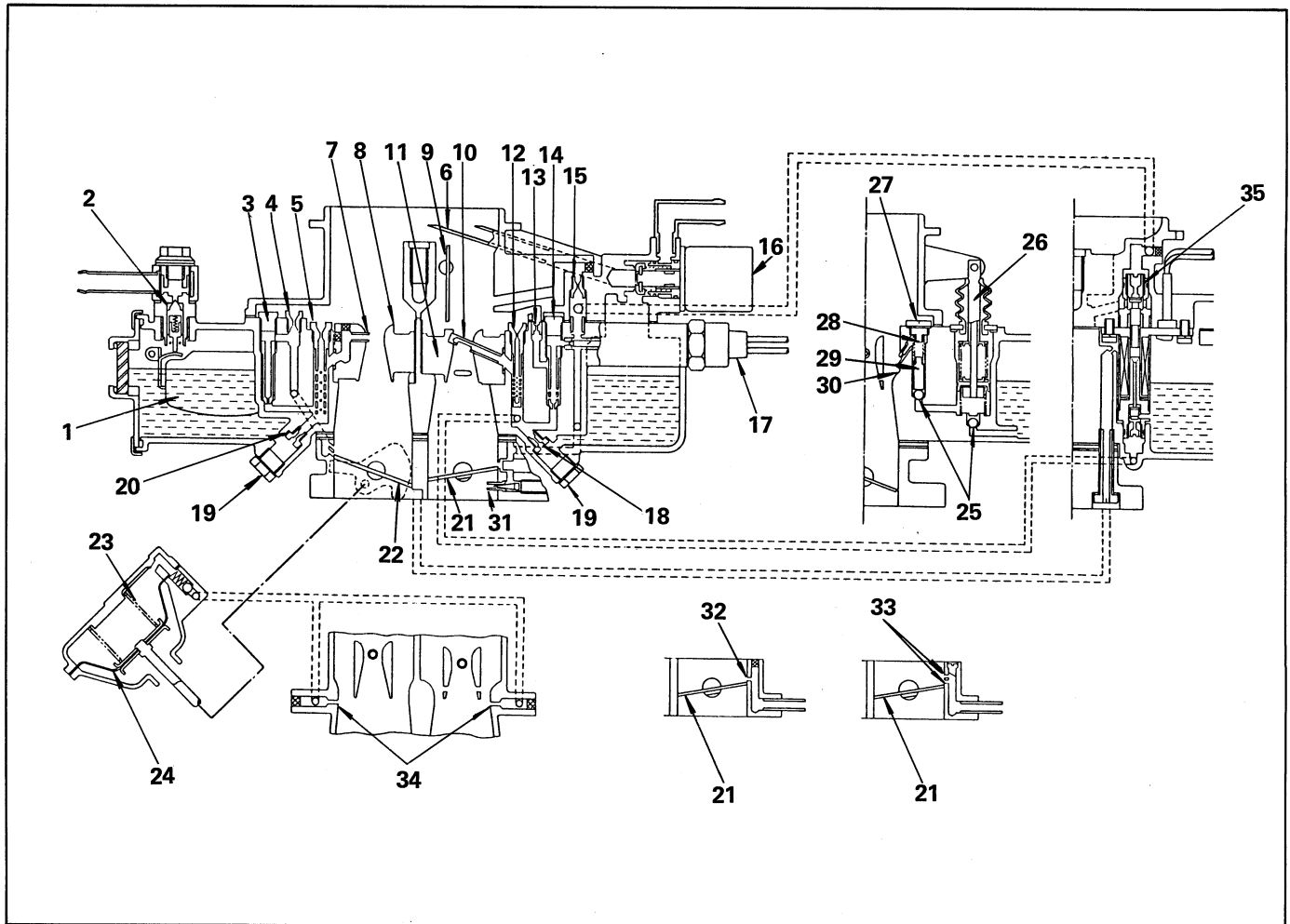
Federal

- | | |
|--|-------------------------------|
| 1. Float | 16. Economized bleed |
| 2. Needle valve | 17. P-Main jet |
| 3. S-Slow jet | 18. Idle mixture adjust screw |
| 4. S-Slow air bleed | 19. Idle hole |
| 5. S-Main air bleed | 20. P-Throttle valve |
| 6. S-Small venturi | 21. EGR signal port |
| 7. S-Main nozzle | 22. Vacuum jet |
| 8. P-Main nozzle | 23. Diaphragm |
| 9. Choke valve | 24. S-Throttle valve |
| 10. P-Small venturi | 25. S-Main jet |
| 11. P-Main air bleed | 26. Accel pump nozzle |
| 12. P-Slow jet | 27. Accel pump piston |
| 13. P-Slow air bleed | 28. Check ball |
| 14. Vent switching valve | 29. Insulator |
| 15. Anti-dieseling solenoid
(Slow cut solenoid) | 30. Vacuum piston |
| | 31. Power valve |

P : Primary

S : Secondary

California only

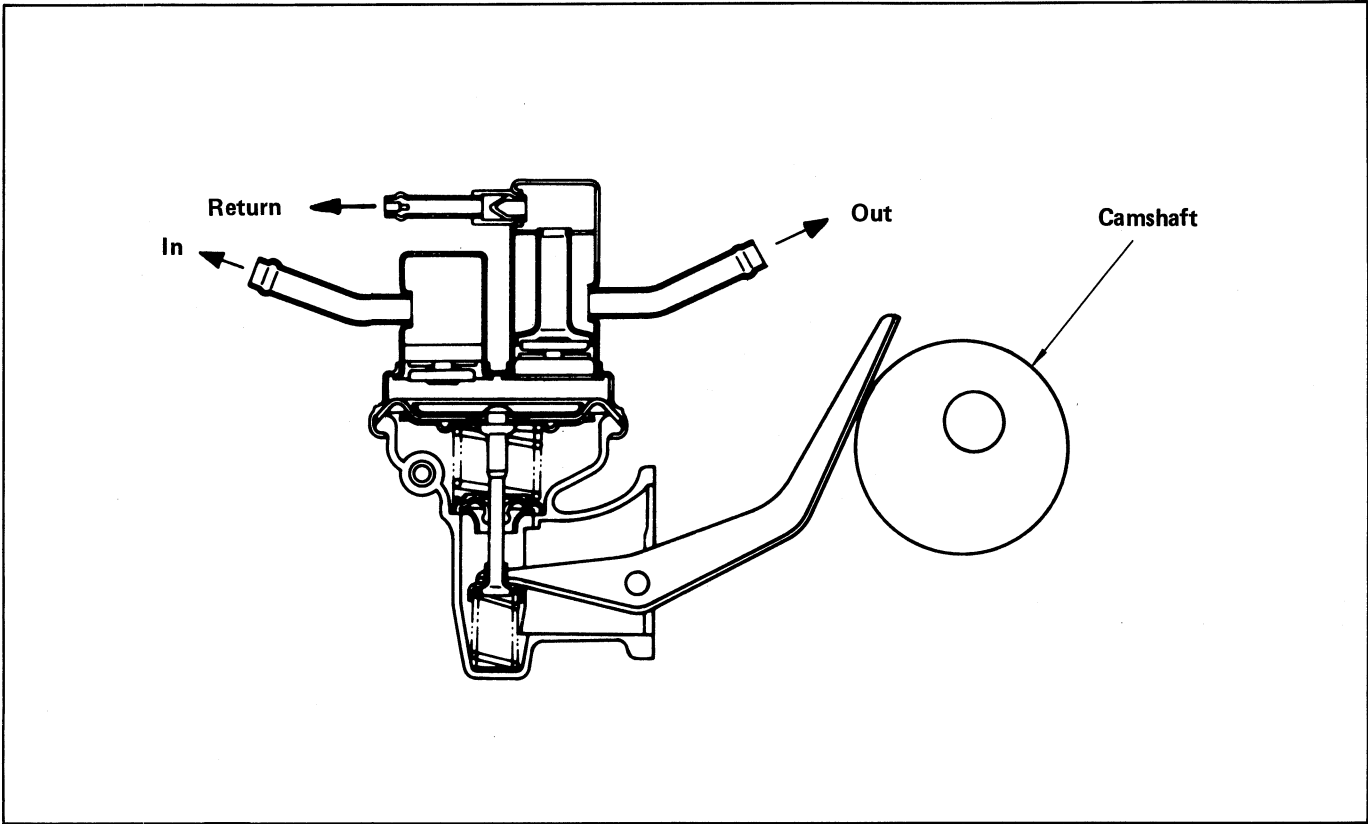


- | | |
|-----------------------------|-----------------------------|
| 1. Float | 19. Drain plug |
| 2. Needle valve | 20. S-Main jet |
| 3. S-Slow jet | 21. P-Throttle valve |
| 4. S-Slow air bleed | 22. S-Throttle valve |
| 5. S-Main air bleed | 23. Diaphragm spring |
| 6. Air vent | 24. Diaphragm |
| 7. S-Main nozzle | 25. Check ball |
| 8. S-Small venturi | 26. Accel pump piston |
| 9. Choke valve | 27. Injector plug |
| 10. P-Main nozzle | 28. Injection spring |
| 11. P-Small venturi | 29. Injector weight |
| 12. P-Main air bleed | 30. Accel pump nozzle |
| 13. Economizer bleed | 31. Idle hole |
| 14. P-Slow jet | 32. Advance signal port |
| 15. P-Slow air bleed | 33. EGR signal port |
| 16. Switch vent valve | 34. Vacuum jet |
| 17. Slow cut solenoid valve | 35. Duty solenoid valve asm |
| 18. P-Main jet | |

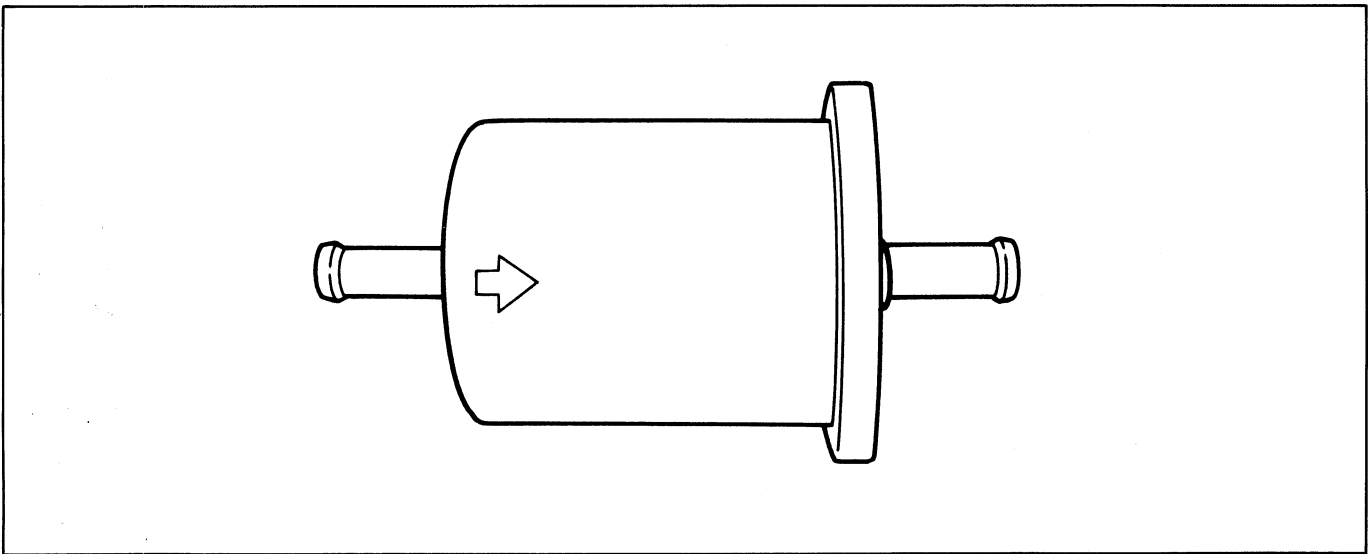
P : Primary

S : Secondary

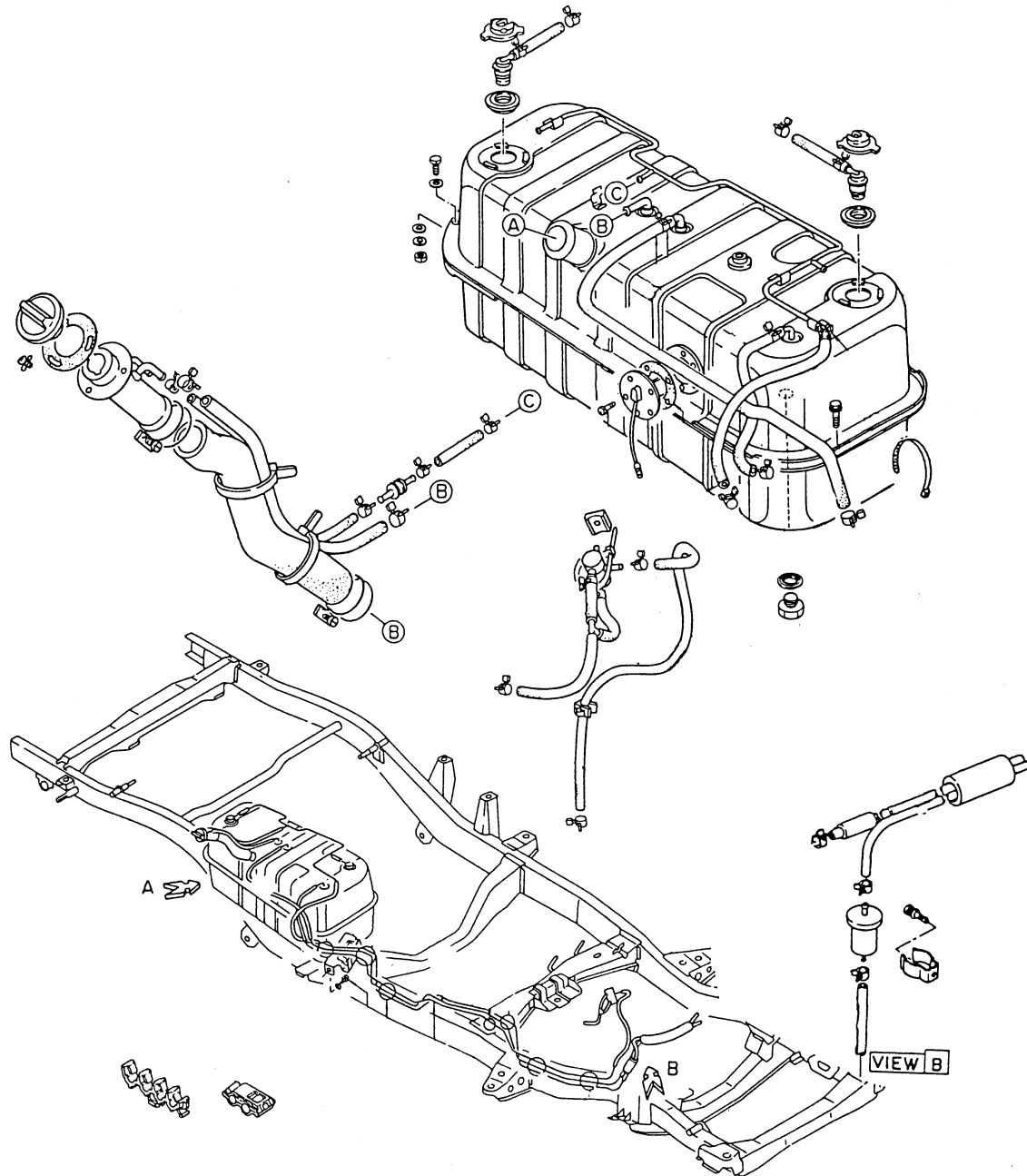
FUEL PUMP



FUEL FILTER



FUEL TANK AND FUEL LINE



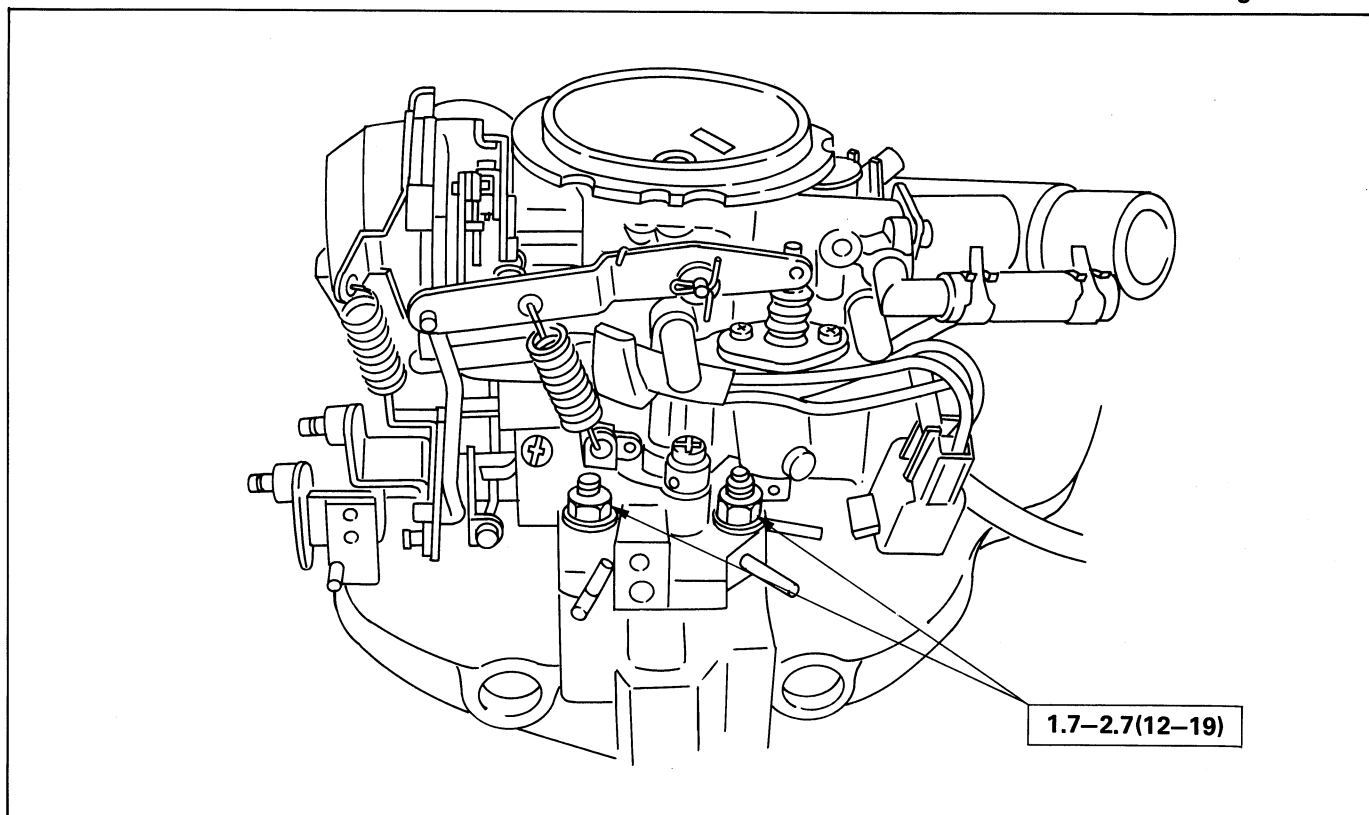
MAIN DATA AND SPECIFICATIONS

CARBURETOR

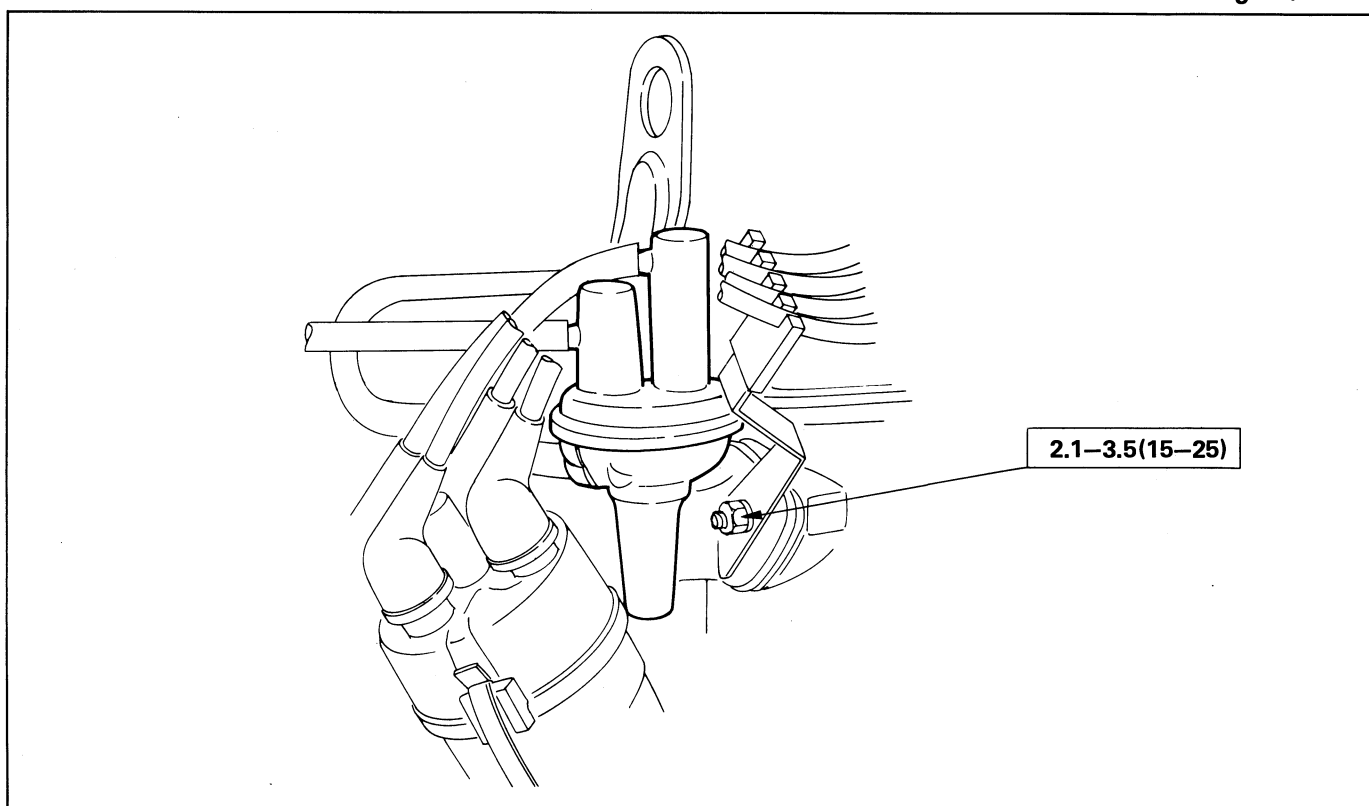
		Federal (DCH340)	California (DHP340)
Type		Strombrg 2-Barrel down draft	
Air horn diameter (inside)		75 mm (2.95 in.)	
Fuel pressure		0.25 kg/cm ² (3.56 psi.)	
Outlet Diameter	(P)	30 mm (1.18 in.)	
	(S)	34 mm (1.34 in.)	
Venturi diameter-Large	(P)	24.1 mm (0.95 in.)	
	(S)	31 mm (1.22 in.)	
Main jet	(P)	#114	# 93
	(S)	#170	#180
Slow jet	(P)	# 50	# 53
	(S)	#100	#125
Power valve		# 50	—
Main air-bleed		#120	#100
	(S)	# 70	# 90
Slow air-bleed	(P)	#150	#120
	(S)	#100	#130
Idle port		1.7 mm (0.067 in.)	
Accelerator-Pump nozzle (Diameter)		0.5 mm (0.02 in.)	
Accelerator-Pump delivery (1 stroke)		0.55 cm ³ (0.034 in ³)	0.45 cm (0.027 in ³)
Power valve opening pressure		-10.65 kPa (-3.15 in. Hg)	
Throttle valve opening angle with the choke valve closed		16 degrees	
Diaphragm spring (Set force) (Full stroke)		300g (0.66 lbs.) 570g (1.26 lbs.)	
Engine speed at which Diaphragm opens (when engine is fully loaded)		47 degrees	
Main nozzle inside	(P)	2.8 mm (0.110 in.)	
Diameter	(S)	2.8 mm (0.110 in.)	
Throttle valve	(P)	10 degrees	
Closing angle	(S)	20 degrees	
(P) : Primary side (S) : Secondary side			
Fuel pump Type Fuel filter		Mechanical diaphragm Cartridge	
Fuel tank Capacity	liter(gal.)	50 (13.2)	

MAJOR PARTS ; FIXING NUTS AND BOLTS

kg-m(ft.lbs.)



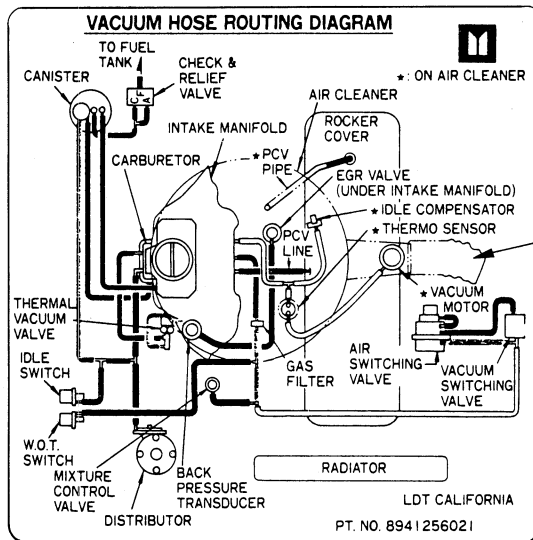
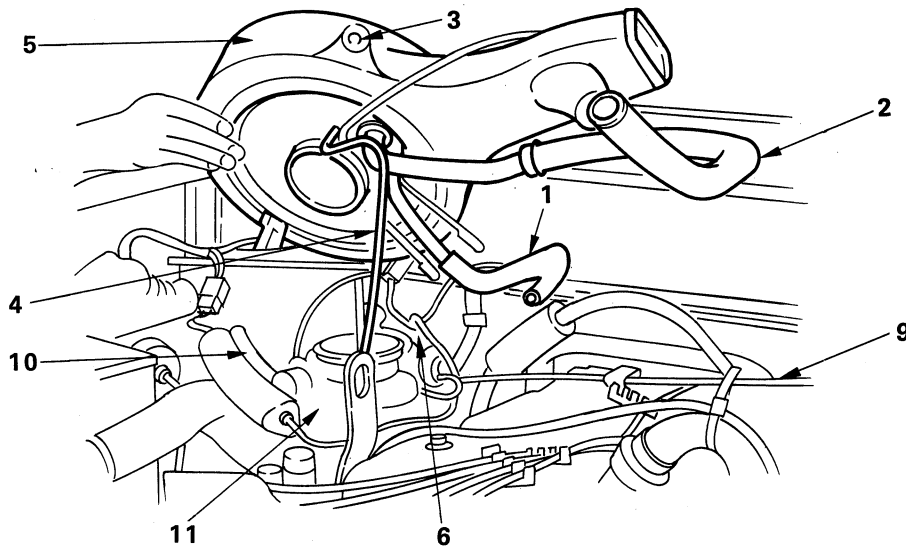
kg-m(ft.lbs.)



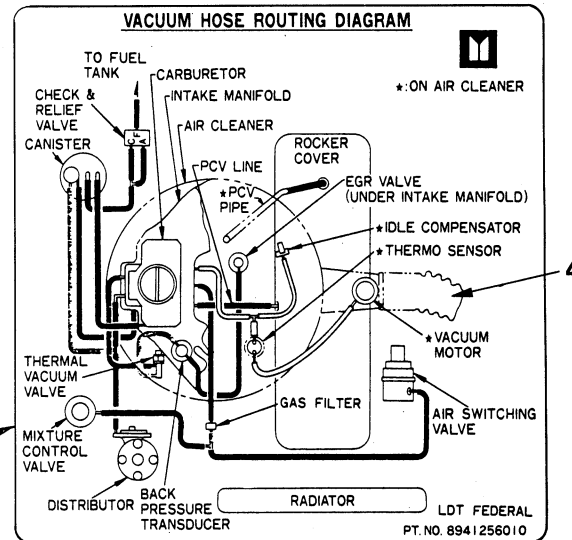
CARBURETOR



REMOVAL AND INSTALLATION



For California



For Federal

Removal steps

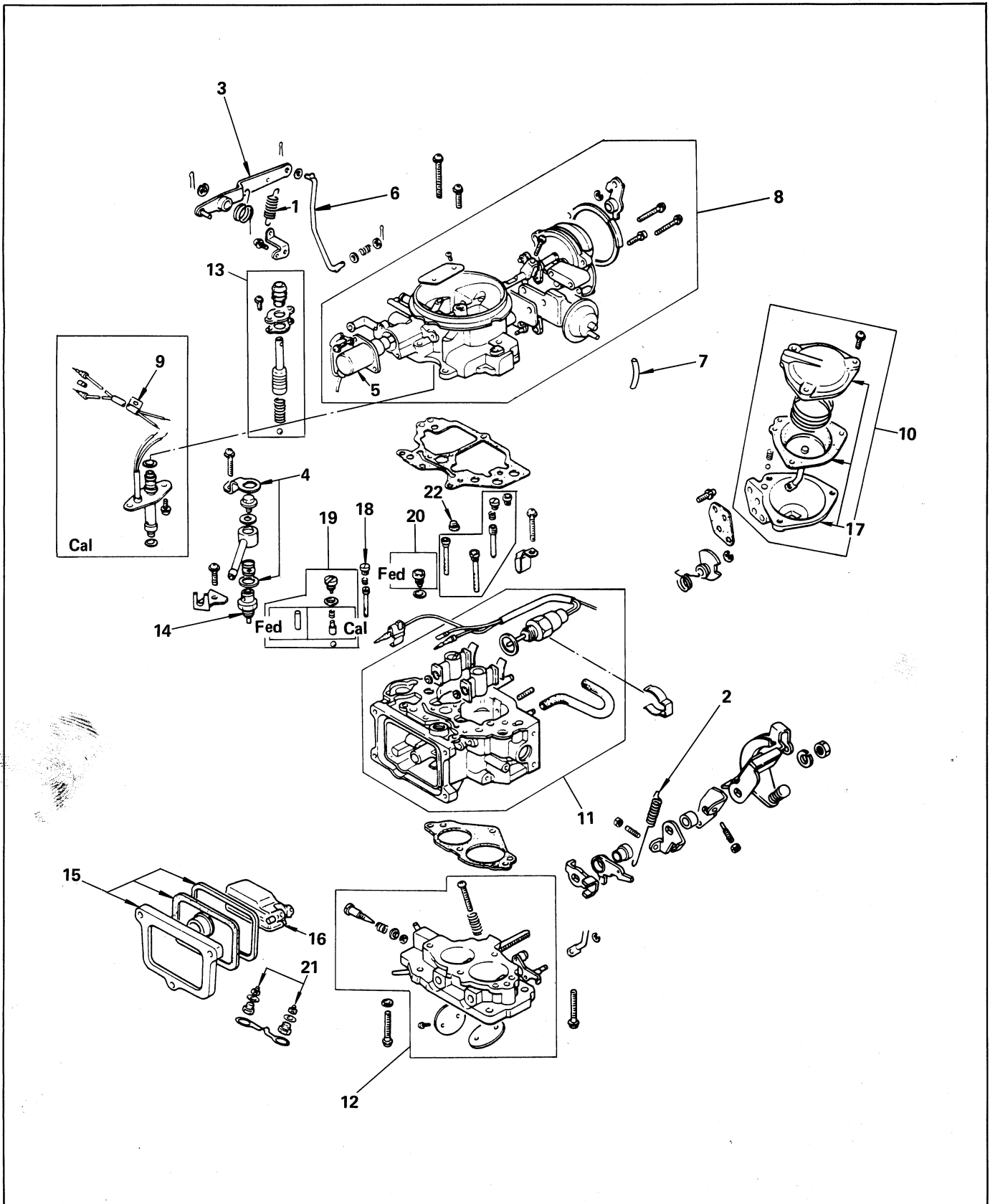
1. P.C.V. hose
2. A.I.R. hose
3. Bolts ; attaching air cleaner
4. T.C.A. vacuum hose and air duct
5. Air cleaner
6. Throttle return spring
7. Emission control vacuum hoses
8. Lead wire connector
9. Accel control cable
10. Fuel pipes
11. Carburetor assembly

Installation steps

To install the carburetor, reverse the removal procedure



DISASSEMBLY AND REASSEMBLY



Disassembly steps

- ▲ 1. Pump lever spring
- ▲ 2. Throttle return spring
- ▲ 3. Pump lever
- ▲ 4. Fuel nipple and strainer
- ▲ 5. Switch ; vent valve
- ▲ 6. Rod ; pump
- ▲ 7. Vacuum hose ; automatic choke
- ▲ 8. Chamber assembly ; choke
- ▲ 9. Clip
- ▲ 10. Diaphragm assembly
- ▲ 11. Float chamber assembly
- ▲ 12. Throttle chamber assembly
- ▲ 13. Accelerating pump plunger assembly
- ▲ 14. Float needle valve assembly
- ▲ 15. Level gauge cover and level gauge
- ▲ 16. Float
- ▲ 17. Diaphragm chamber
- ▲ 18. Jets, (on upper part of float chamber)
- ▲ 19. Injector weight plug, injector weight and check ball
- ▲ 20. Power jet ; (Federal only)
- ▲ 21. Main jet plugs and primary
- ▲ 22. Primary show air bleed

Reassembly steps

- 1. To reassemble the carburetor, follow the disassembly procedure in reverse order.
- 2. On models built to meet Federal Standards, care must be taken not to bend the valve rod when you are installing the power jet valve.
- 3. Reassemble the accelerator pump. Then fill the cylinder with fuel and make sure that the fuel is being injected smoothly. During reassembly of the accelerator pump, be very careful not to bend the piston connecting rod.
- 4. During reassembly of the main actuator, apply grease to the "O" ring before tightening the attaching screws. This will prevent inadvertent cracking of the "O" ring.

Note:

Always use the proper tools to assemble or disassemble the carburetor. Be careful not to damage any of the parts. Keep all of the parts free of dust, dirt, and other foreign matter.

Always keep disassembled parts in separate groups, depending upon which part of the carburetor they were removed from. This is to avoid mixing the parts up.

All parts of the carburetor should be cleaned only in carburetor cleaner. Jets and orifices should be blasted clean with compressed air.

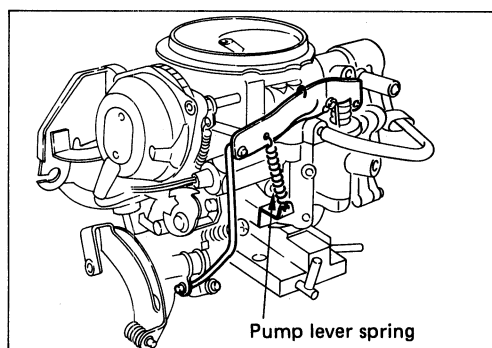
Never use a piece of wire to scrape clean the jets or orifices. Adjacent areas will be scratched and performance will be adversely affected.



Important operation — Disassembly

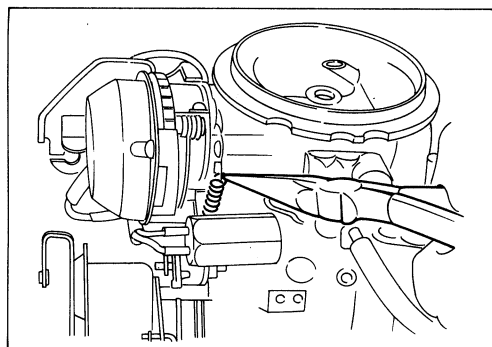
1. Pump lever spring

Remove the pump lever spring.



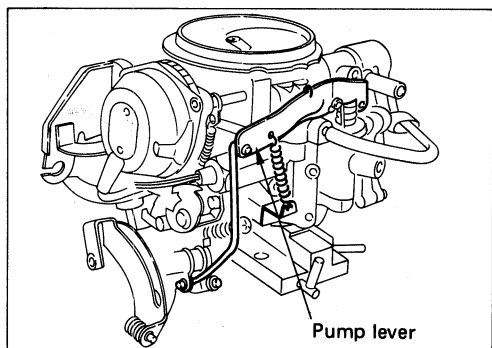
2. Throttle return spring

Remove the throttle return spring.

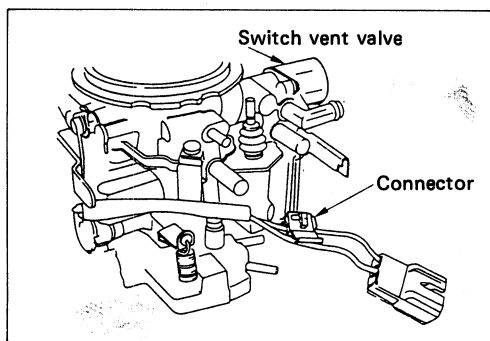


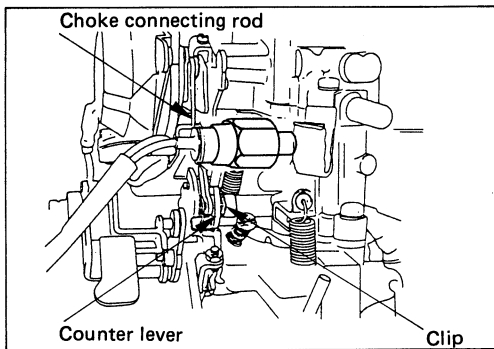
3. Pump lever

Disconnect the accelerator pump lever.



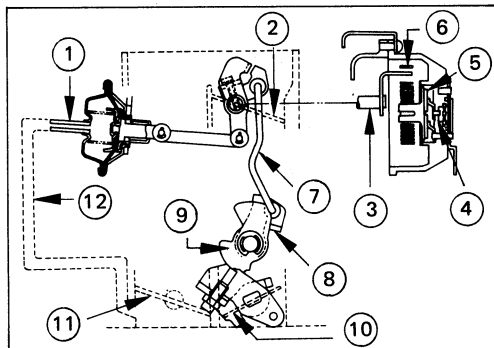
5. Switch ; vent valve





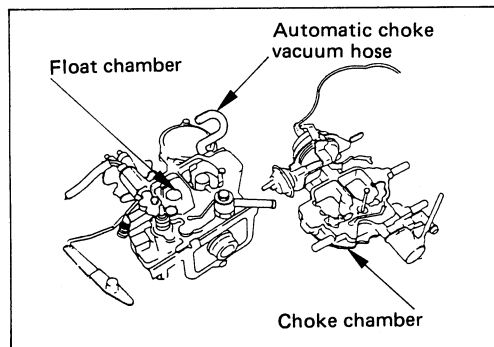
6. Rod ; pump

Disconnect the choke connecting rod from the counter lever by removing the circlip.



Automatic choke system

- | | |
|--------------------------------|----------------------------|
| ① Choke breaker diaphragm unit | ⑦ Choke connecting rod |
| ② Choke valve | ⑧ Control lever |
| ③ Choke shaft | ⑨ Fast idle cam |
| ④ Bimetal switch | ⑩ Primary throttle valve |
| ⑤ Heater | ⑪ Secondary throttle valve |
| ⑥ Bimetal | ⑫ Vacuum passage |

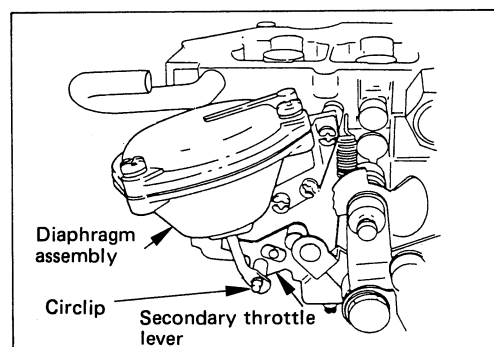


7. Vacuum hose ; automatic choke

8. Chamber assembly ; choke

Disconnect the automatic choke vacuum hose from the float chamber.

Remove the screws attaching the choke chamber assembly to the float chamber and remove the choke chamber assembly.

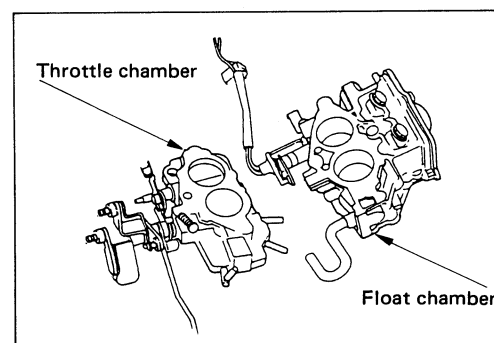


9. Clip

10. Diaphragm assembly

Remove the circlip between the diaphragm and the secondary throttle lever.

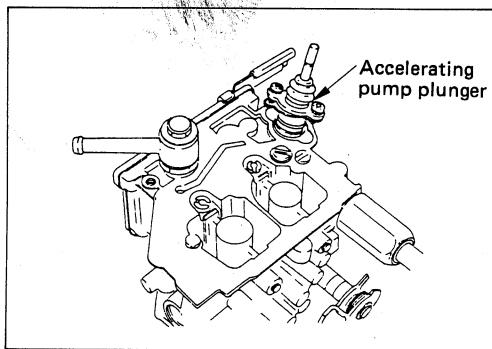
Loose three diaphragm chamber attaching screws, then remove the diaphragm assembly.



11. Float chamber assembly

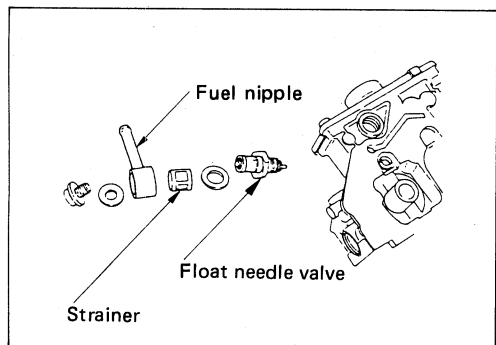
12. Throttle chamber assembly

Sparate the float chamber assembly from the throttle chamber assembly.



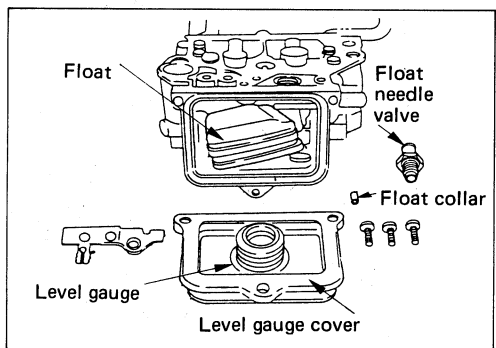
13. Accelerating pump plunger assembly

Remove the accelerating pump plunger assembly and the spring.



14. Float needle valve assembly

Remove the float needle valve assembly.



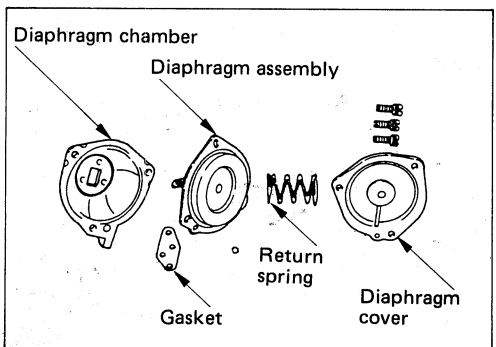
15. Level gauge cover and level gauge

Remove three screws retaining level gauge cover, then remove the level gauge and the float.

Note: Do not to damage the rubber seal

16. Float

Note: Do not to lose the float collar



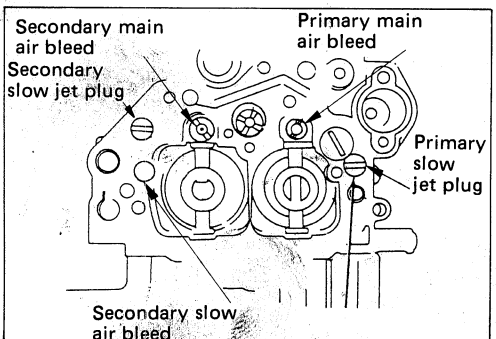
17. Diaphragm chamber

Disassembly of the diaphragm chamber.

Remove screws retaining diaphragm cover.

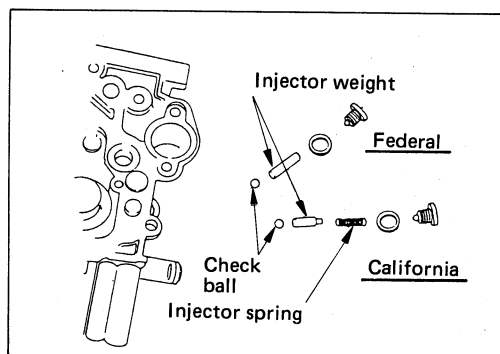
Separate diaphragm cover, diaphragm spring, and diaphragm.

Note: Do not to lose the ball and spring



18. Jets (on upper part of float chamber)

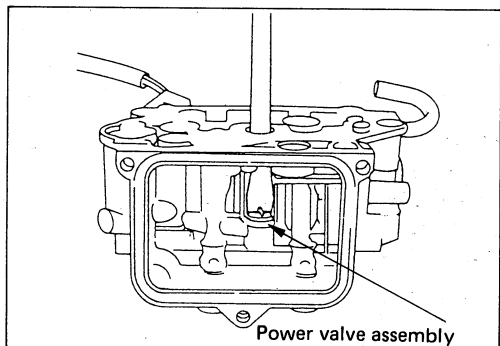
Remove the jets on upper part of the float chamber.



19. Injector weight plug, injector weight and check ball

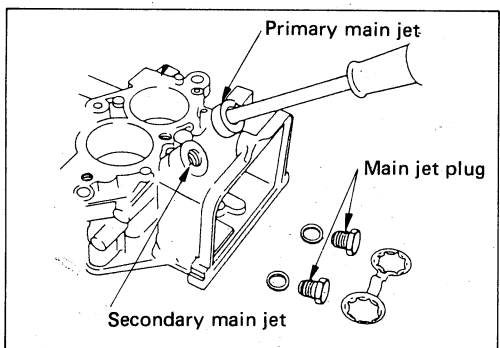
Remove the injector weight plug, and take out the injector weight, ball, and spring.

Note: Injector spring (California only)

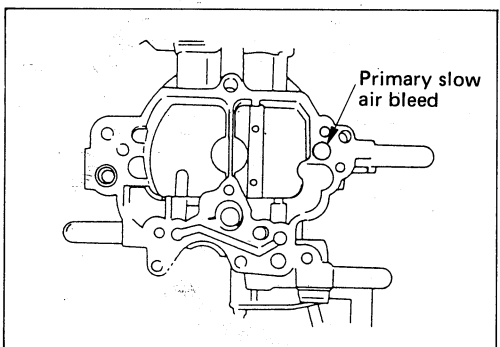


20. Power jet (Federal only)

Note: Be sure to place a screwdriver properly into the slot to prevent valve rod damage.



21. Two (2) main jet plugs and primary and secondary main jets.



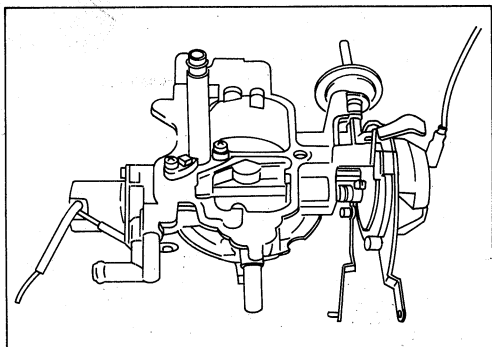
22. Primary slow air bleed

Remove the primary slow air bleed from the choke chamber.

Note: Do not remove the screws holding the primary throttle valve, the secondary throttle valve and the choke valve.



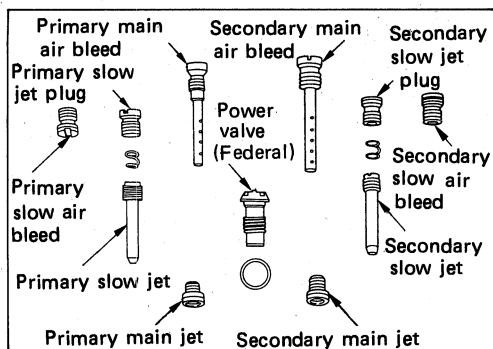
INSPECTION AND REPAIR

**Choke chamber**

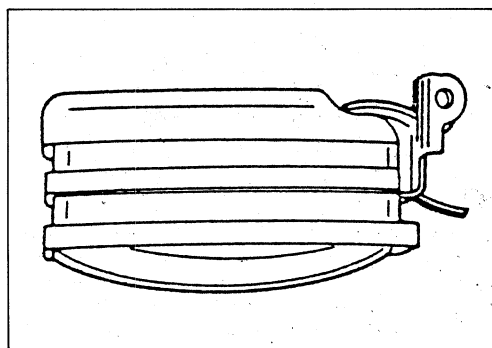
- Inspect the choke chamber for cracks and damage, paying particular attention to the jointing face of the chamber.
- Check shaft holes for wear.
- Check choke valve for smoothness of operation.
- On Federal model, check vacuum piston for smoothness of operation.

2. Float chamber

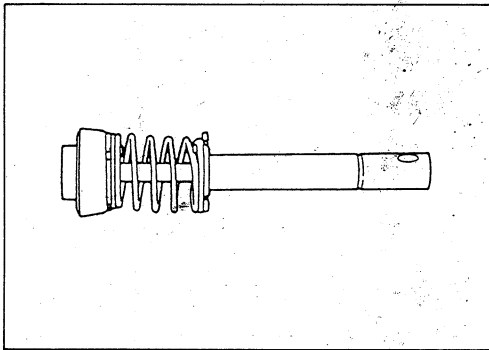
- Inspect and remove any carbon deposits from inside the body.
- Inspect the body for cracks, and the jointing face for damage, check the threaded portions for damage and corrosion.



- Inspect the jet mounting holes, the threaded portions and the screwdriver slots for damage.
- Check the power valve for leaks, and the power valve rod for bending and smoothness of operation (Federal models).



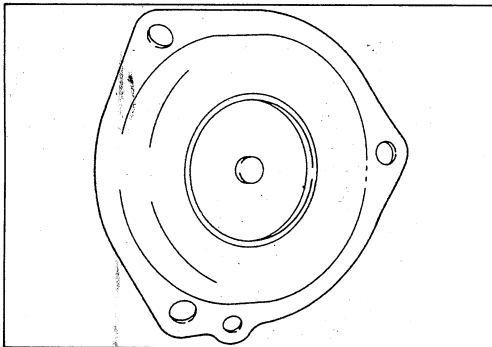
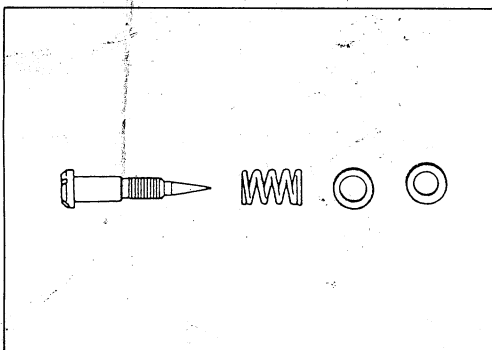
- Inspect the needle valve for sticking, dirt, and corrosion.
- Carefully check the float for pin holes and wear.



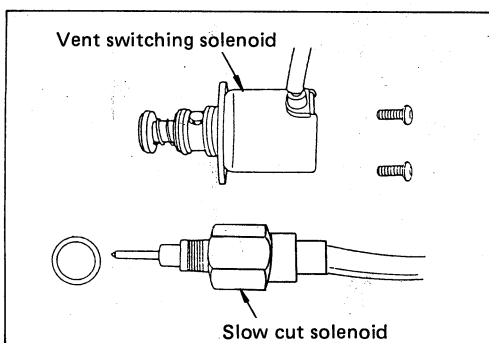
- Inspect the strainer in the fuel pipe nipple for dirt, corrosion, and damage.
- Inspect the accelerating pump plunger for damage and distortion. Also check for smooth plunger movement within the cylinder.
- Check the rubber boot of the accelerating pump for damage.

Throttle Chamber

- Check the slow port, the idle port and the others for clogging.
- Check the primary and secondary throttle valve for presence of carbon deposit and wear.
- Check the throttle valve shaft holes for wear.
- Check the mixture adjusting screw seating face for step wear and the threaded portion for damage.



- Check the diaphragm for deterioration and damage.

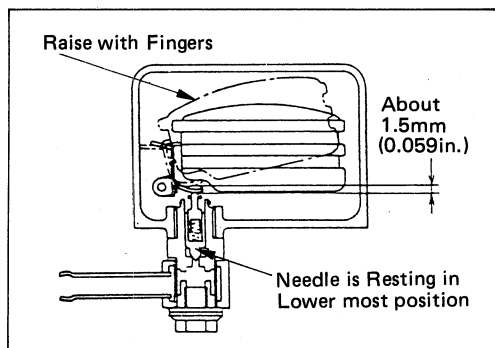


Solenoid

Inspect the solenoid for looseness of attaching parts and damage to the wire harness connection.



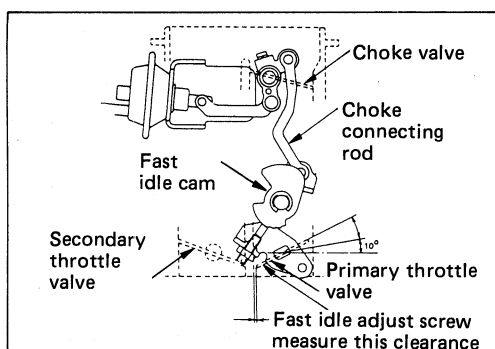
ADJUSTMENTS

**1. Float level**

The fuel level is normal if it is within the mark on the window glass of the float chamber when engine is idling. If the fuel level is outside the line, make necessary adjustments by bending the float seat. The needle valve should have an effective stroke of about 1.5 mm (0.059 in.).

To check the stroke, hold the carburetor with the bottom side up and fully raise the float.

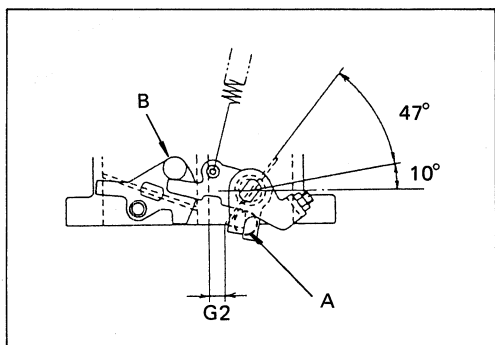
The needle valve stroke is normal when a clearance of 1.5 mm (0.059 in.) exists between the valve stem (resting at its bottom position) and the float seat. When necessary, the needle valve stroke can be adjusted by bending the float stopper.

**2. Primary throttle valve adjustment**

Check and make necessary adjustments so that the primary throttle valve is opened by means of the fast idle adjusting screw to an angle of 16° when the choke valve is completely closed. To check the opening angle of the primary throttle valve, proceed as follows:

Close the choke valve completely and measure the clearance between the throttle valve and wall of the throttle valve chamber at the center part of the throttle valve. (Standard clearance is 1.28 to 1.51 mm (0.050 to 0.059 in.))

If necessary, adjust throttle valve opening angle with the fast idle adjusting screw. Be sure to turn the throttle stop screw all the way in before measuring the clearance.

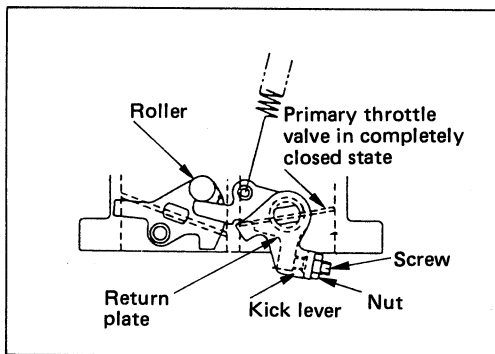
**3. Linkage adjustment**

When the primary throttle valve is opened to an angle of 47 degrees, the adjust plate, which is interlocked with the primary throttle valve, is brought into contact with portion (A) of the kick lever.

When the primary throttle valve is opened further, the return plate is pulled away from the stopper (B), allowing the secondary throttle valve to open.

to determine the secondary throttle valve opening point, proceed as follows: Measure the clearance between the primary throttle valve and the wall of the throttle chamber at the center of the throttle valve when the adjust plate is brought into contact with point (A) of the kick lever.

Standard clearance (G2) is 6.1 to 7.6 mm (0.24 to 0.30 in.). If necessary, make adjustment by bending portion (A) of the kick lever.

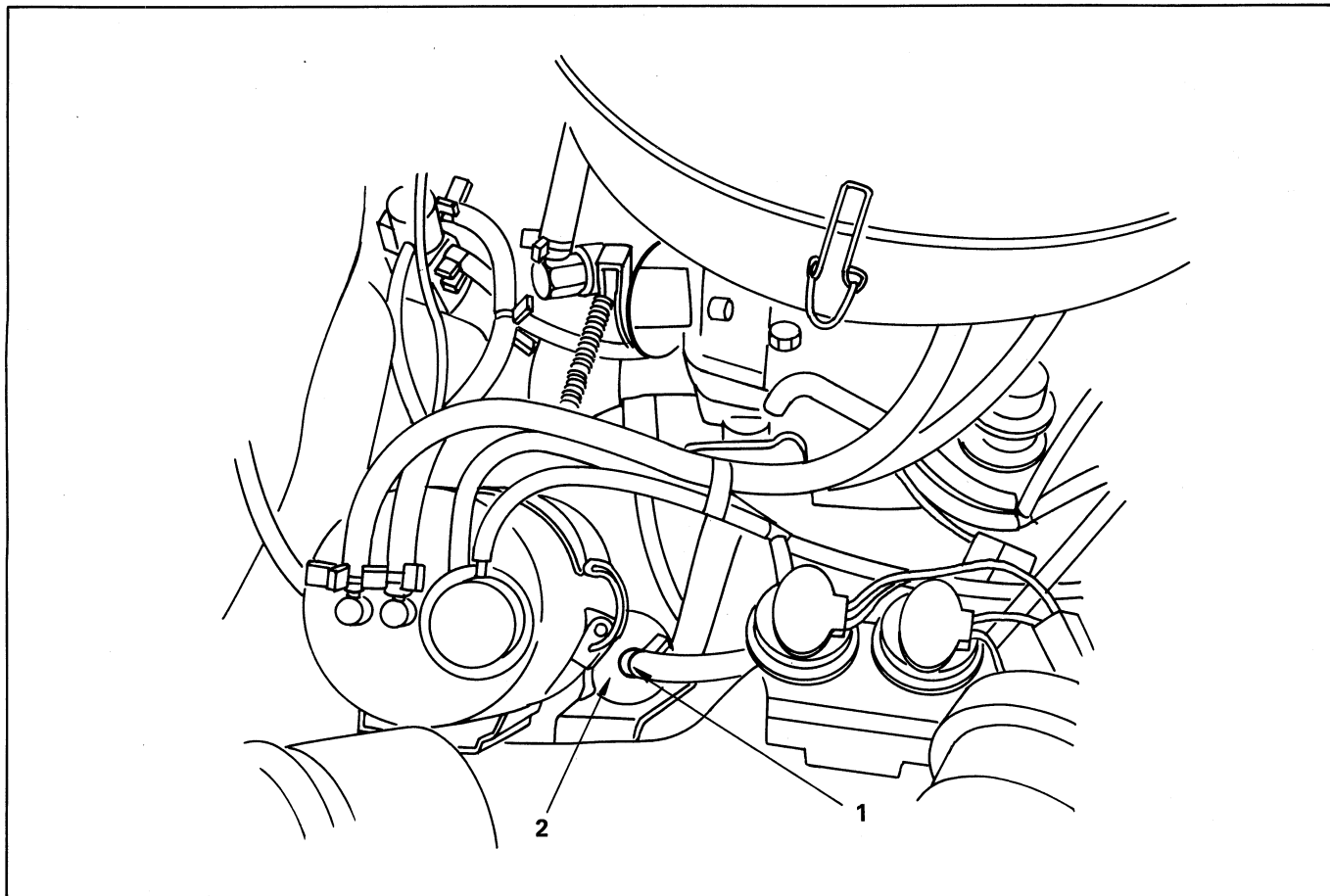
**Kick lever adjustment**

1. Bring the primary side throttle valve into the complete closed position by turning out throttle adjustment screw.
2. With the throttle valve completely closed, loosen the lock nut on kick lever screw and turn the screw until it is in contact with the return plate. Tighten the lock nut.

FUEL FILTER



REMOVAL AND INSTALLATION



Removal steps

1. Loosen the clips attaching the fuel hoses
2. Remove the fuel filter from the fuel hoses

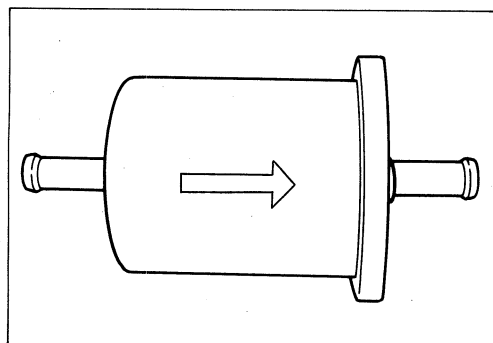
Installation steps

- ▲ 2. Install the fuel filter to the fuel hoses
1. Tighten the clips attaching the fuel hoses

Note: Start the engine and check the hose joints for leakage.



Important operation — Installation



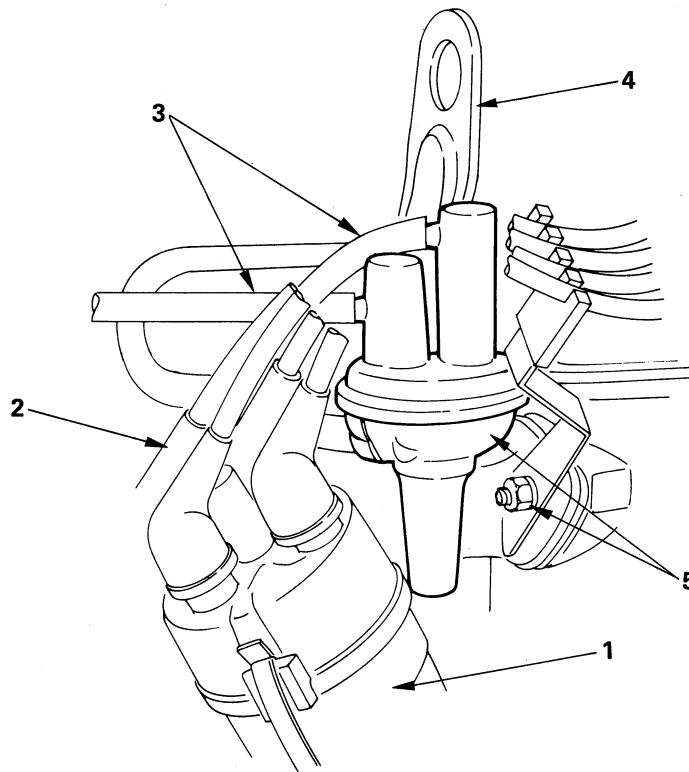
2. Fuel filter

The fuel filter must be attached to the fuel pump in the direction indicated by the arrow stamped on the side of the fuel filter.

FUEL PUMP



REMOVAL AND INSTALLATION



Removal steps

1. Remove the distributor assembly
2. Remove the high tension cables
3. Disconnect the rubber hoses at fuel pump
4. Remove the engine hanger
5. Remove the fuel pump attaching bolt then remove the fuel pump assembly

Installation steps

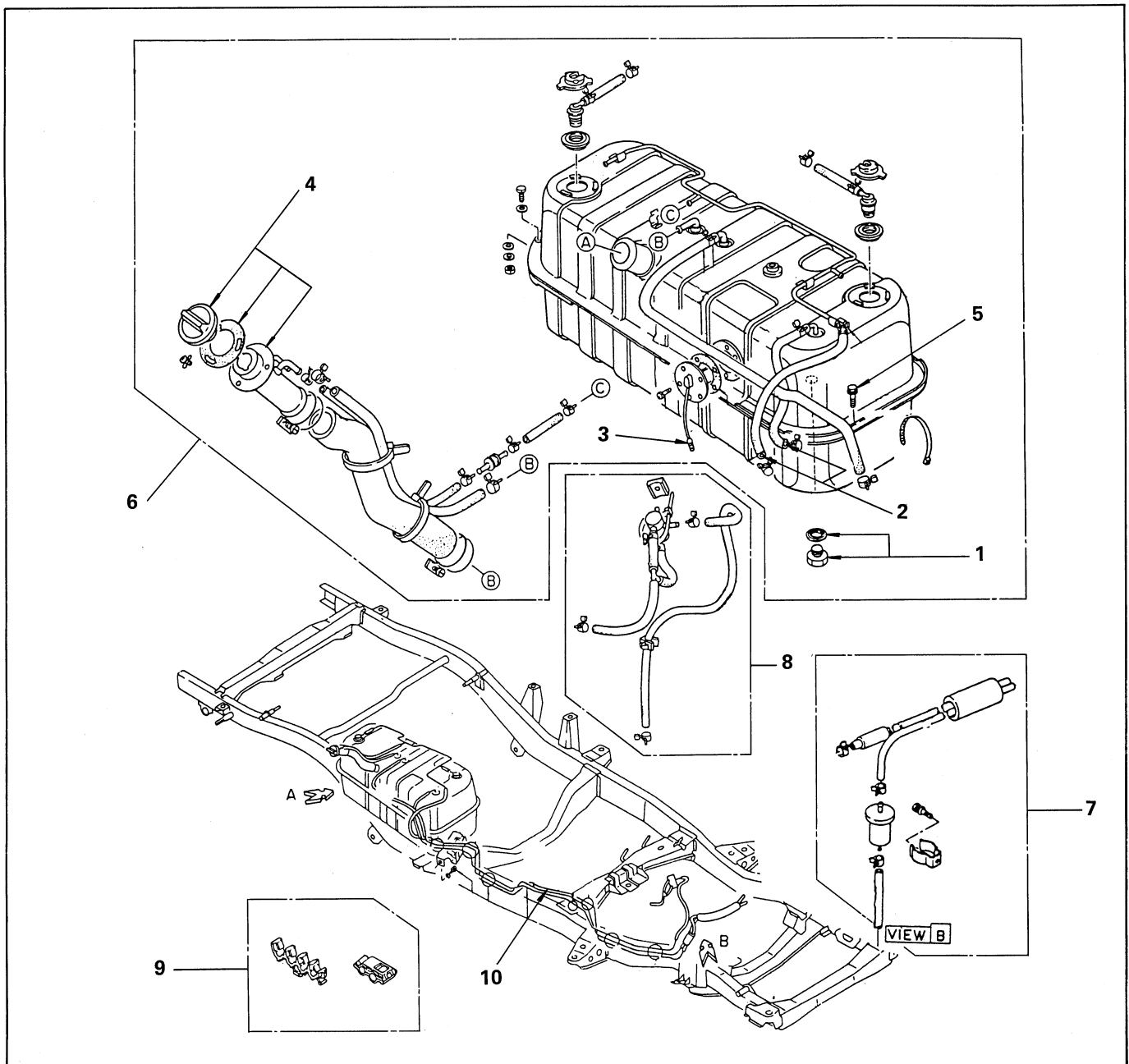
To install the fuel pump, reverse the removal procedure

Note: Start the engine. Check for oil leakage from around the gaskets and for fuel leakage from the hose joints.

FUEL TANK



REMOVAL AND INSTALLATION



Removal steps

1. Plug ; drain (drain the fuel)
2. Hose ; (to return pipe, to feed pipe)
3. Connector fuel tank unit
4. Fuller neck
5. Bolts ; tank fixing
6. Fuel tank assembly
7. Hose, (to feed pipe, to return pipe)
8. Check & relief valve and hose
9. Clips
10. Pipe (feed, return, evaporation)

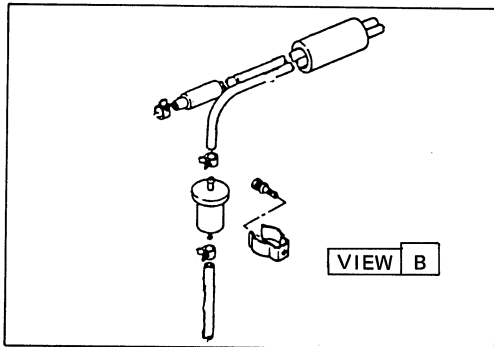
Installation steps

To install, follow to the removal steps in reverse order.



INSPECTION AND REPAIR

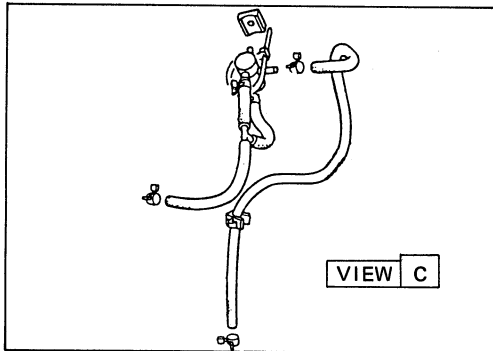
Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



Visual check

Check the following parts for damage or other abnormal conditions.

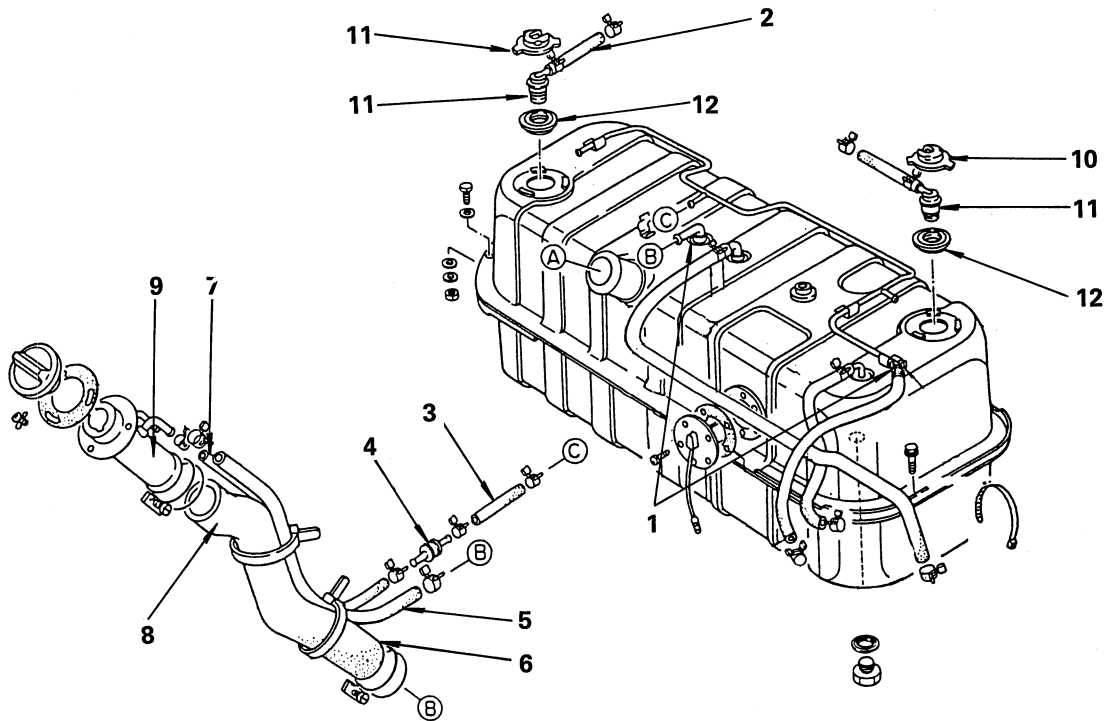
- Rubber hoses
- Fuel filter



- Rubber hoses
- Check & relief valve



DISASSEMBLY AND REASSEMBLY



Disassembly steps

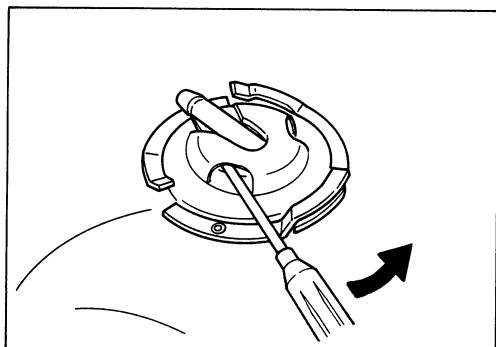
1. Hoses (feed, return, evaporation)
2. Hose ; evaporation
3. Hose ; 2 way valve
4. 2 way valve
5. Hose ; breather
6. Clip filler
7. Hose ; filler neck 2 way
8. Hose ; filler
9. Filler neck assembly
- ▲ 10. Cover ; roll over valve
- ▲ 11. Valve ; roll over
12. Seal ; roll over

Reassembly steps

12. Seal ; roll over
11. Valve ; roll over
10. Cover ; roll over valve
9. Filler neck assembly
8. Hose ; filler
7. Hose ; filler neck 2 way
6. Clip filler
5. Hose ; breather
4. 2 way valve
3. Hose ; 2 way valve
2. Hose ; evaporation
1. Hoses (feed, return, evaporation)

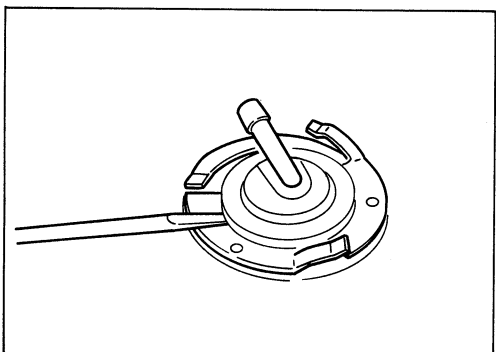


Important operation



10. Cover ; roll over valve

Remove the cover by turning it counter-clockwise with a screw driver.



11. Valve ; roll over and float

Do not attempt to force the valve out of position by holding the pipe, or breakage of the pipe will result.

Force the valve assembly part way out by inserting the edge of a screw driver under the flange of the valve before removing completely.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Hose rubber ; fuel
- Hose rubber ; evaporator
- Hose ; fuel filler

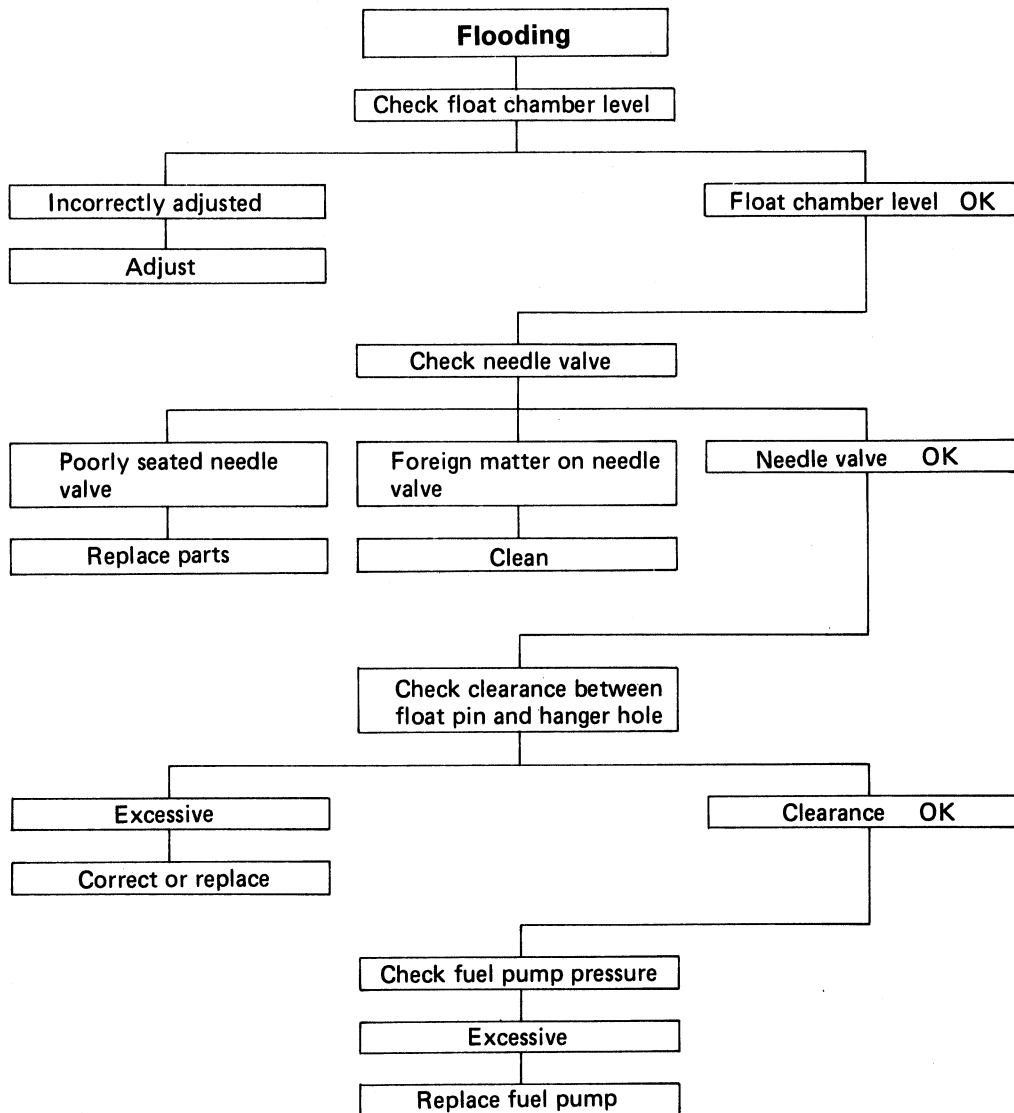


Visual check

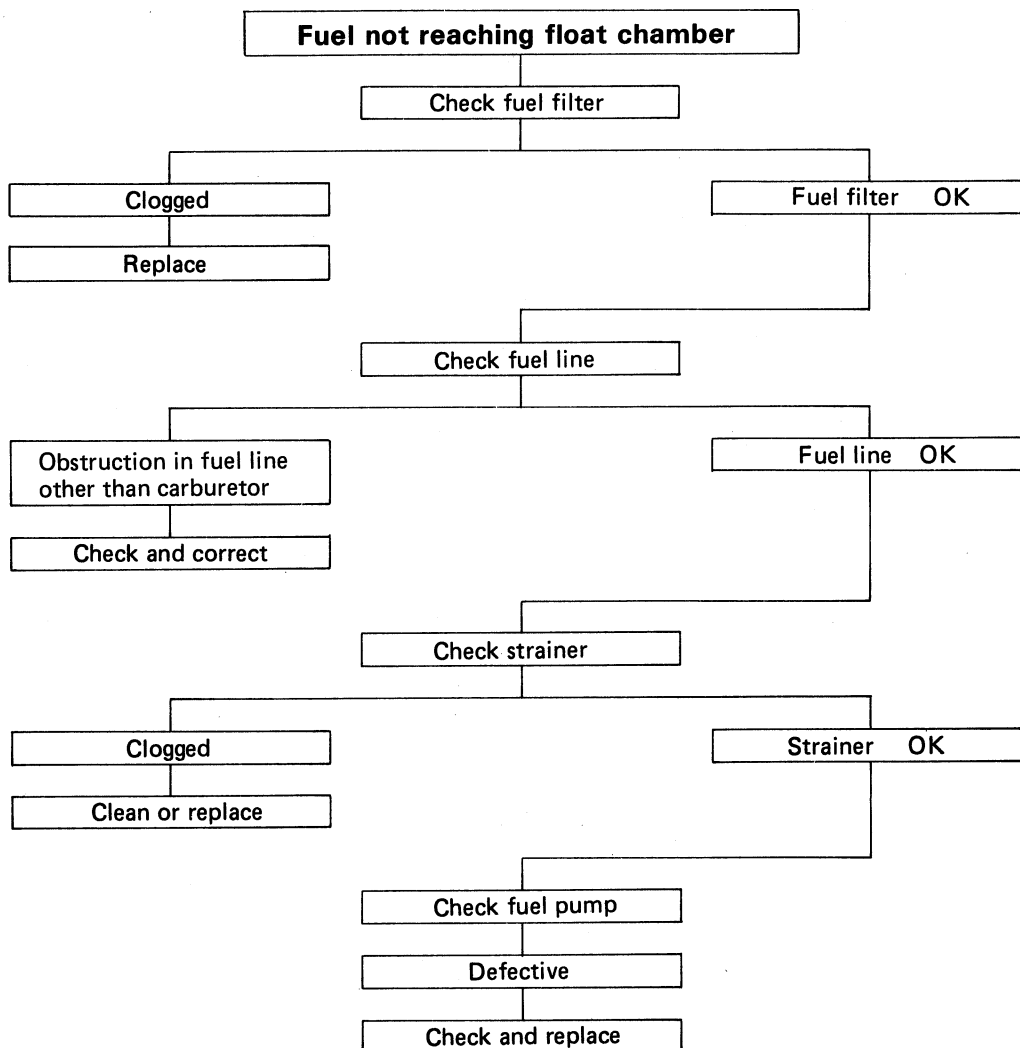
Check the following parts for damage or other abnormal conditions.

DIAGNOSIS

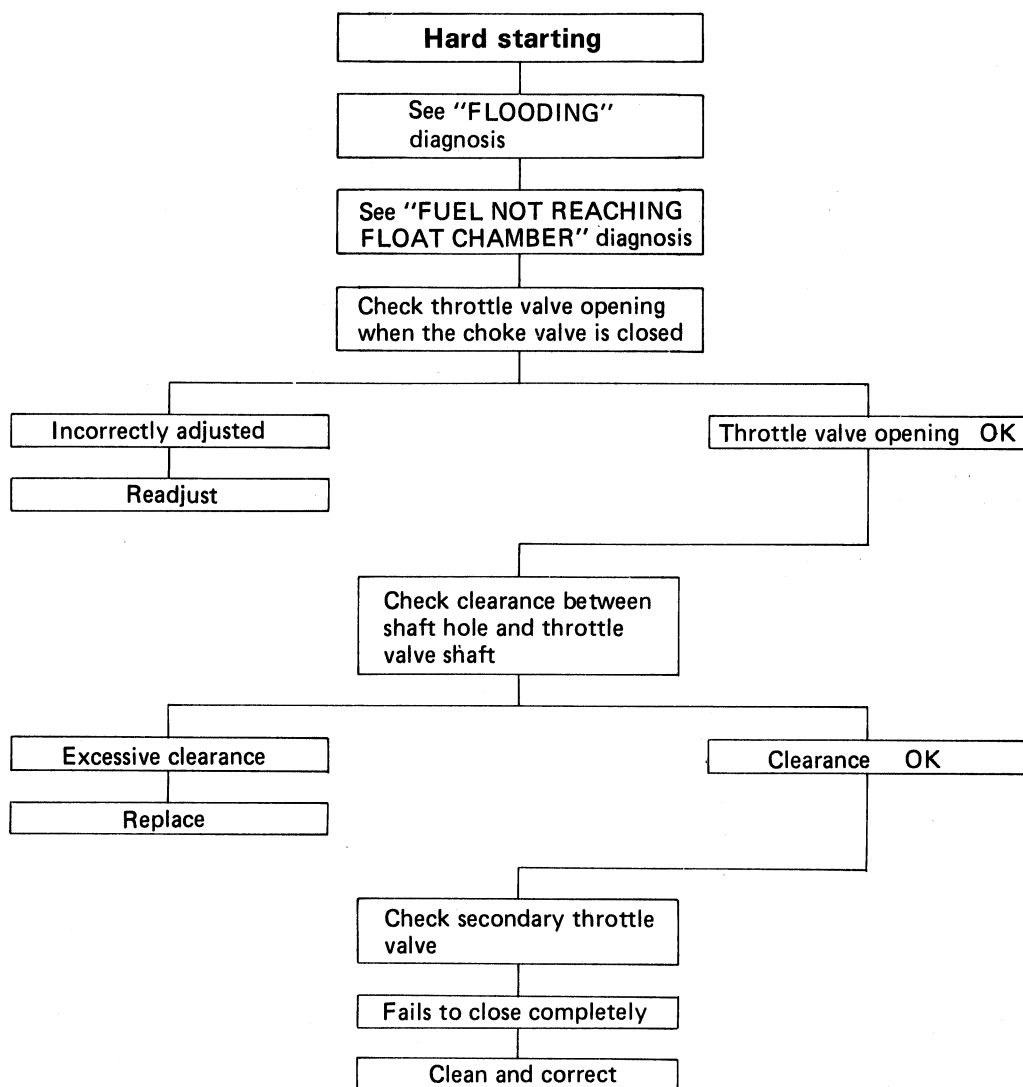
OVER FLOWING



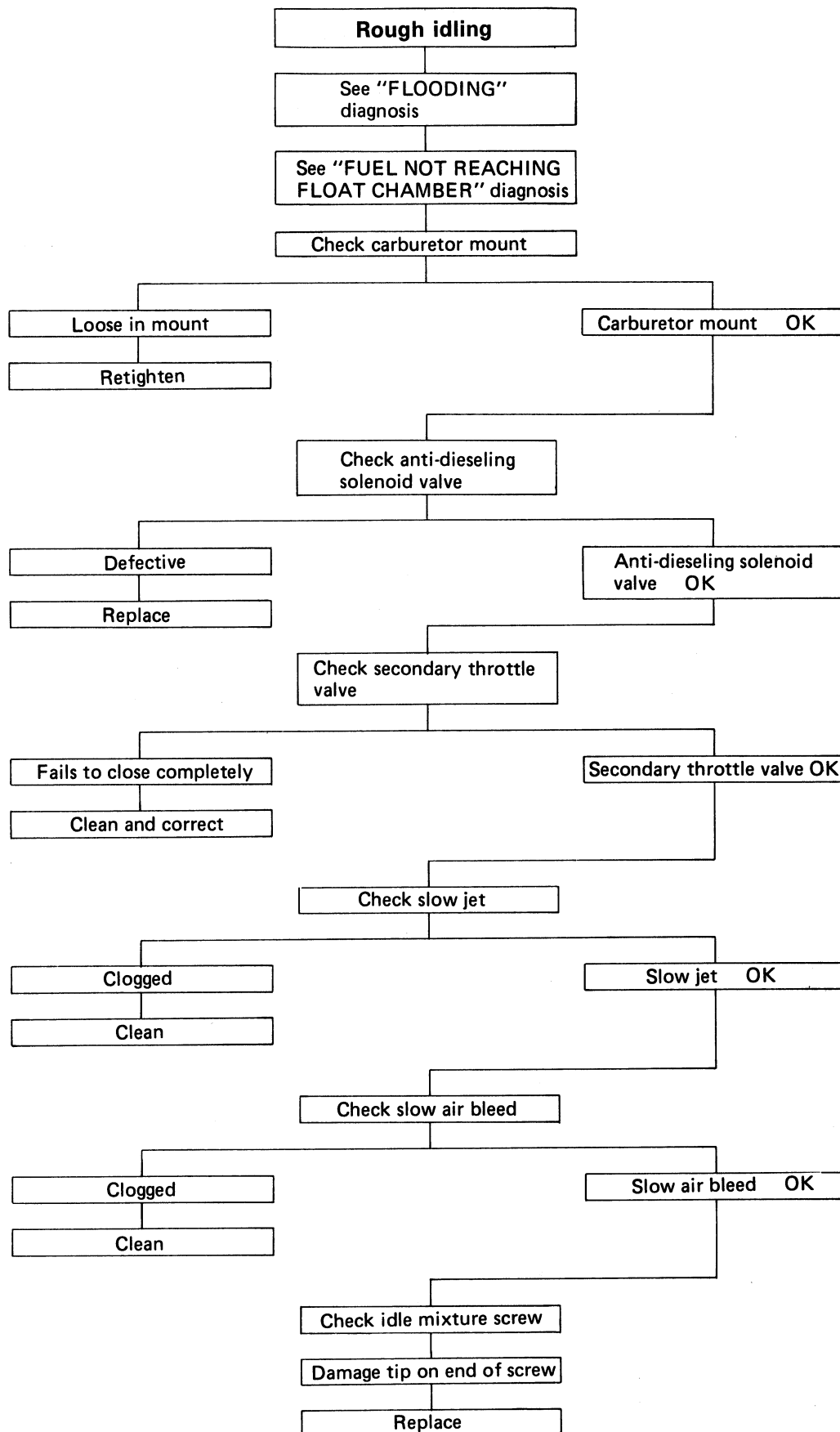
FUEL NOT REACHING FLOAT CHAMBER



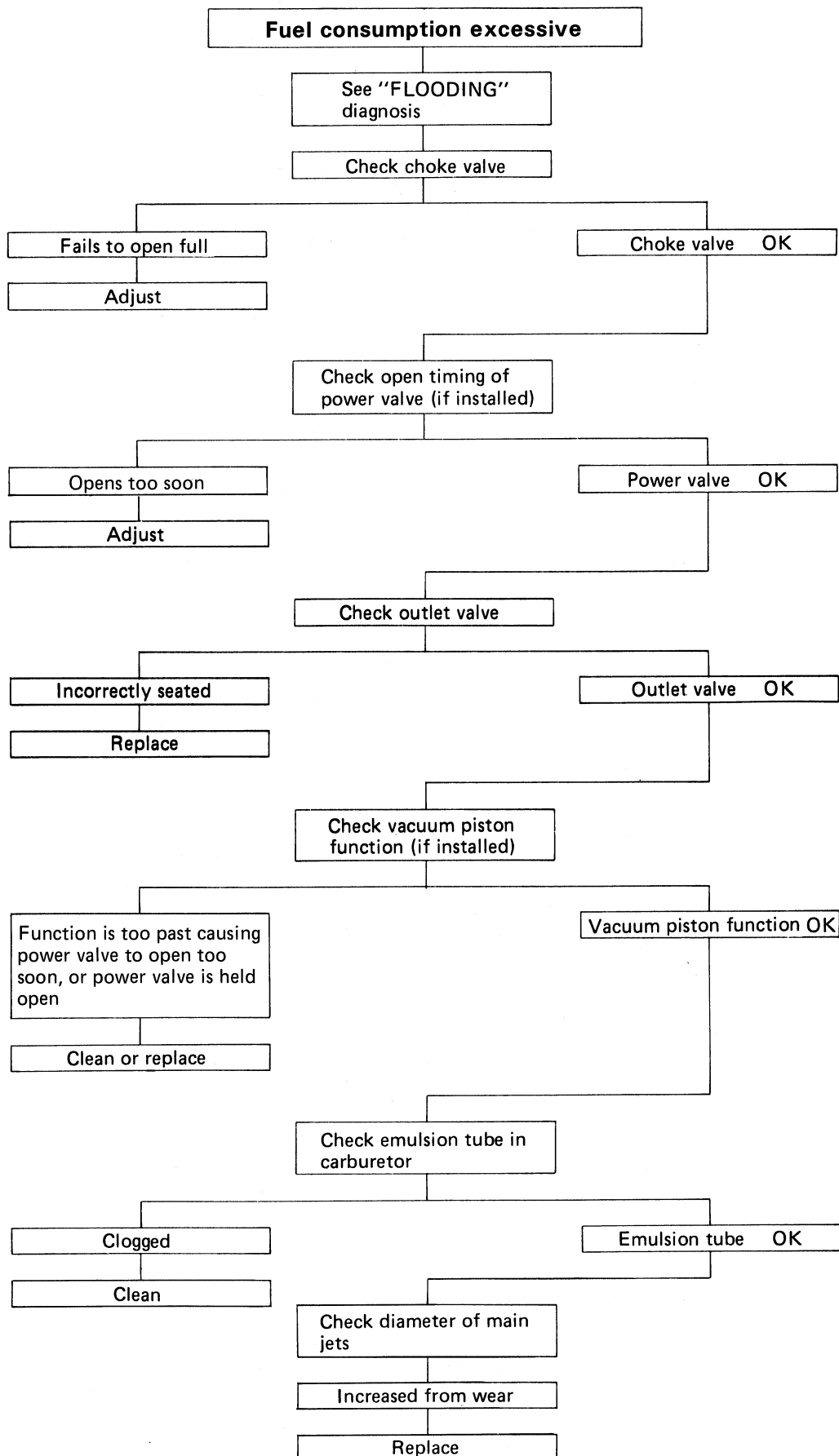
HARD STARTING



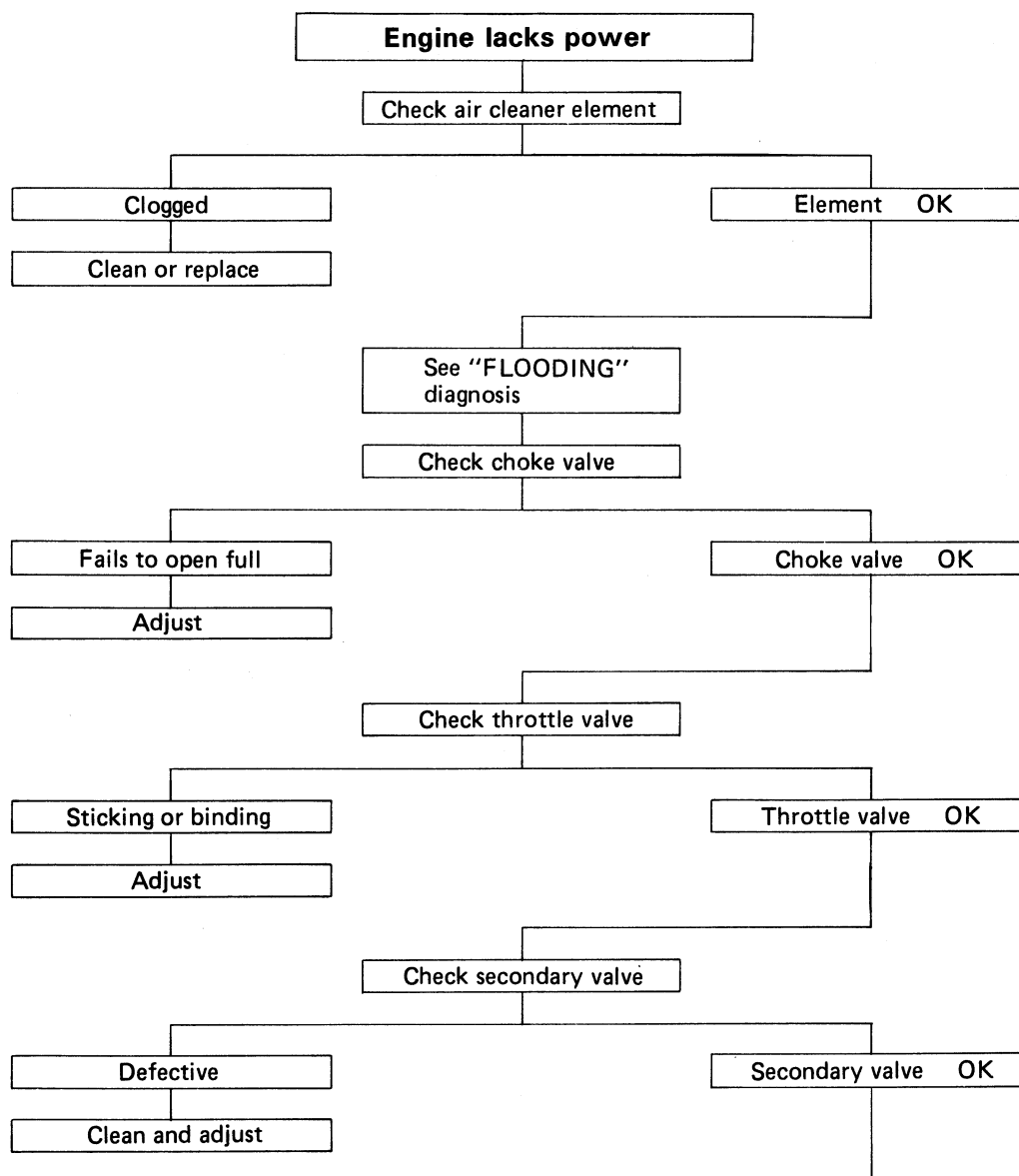
ROUGH IDLING



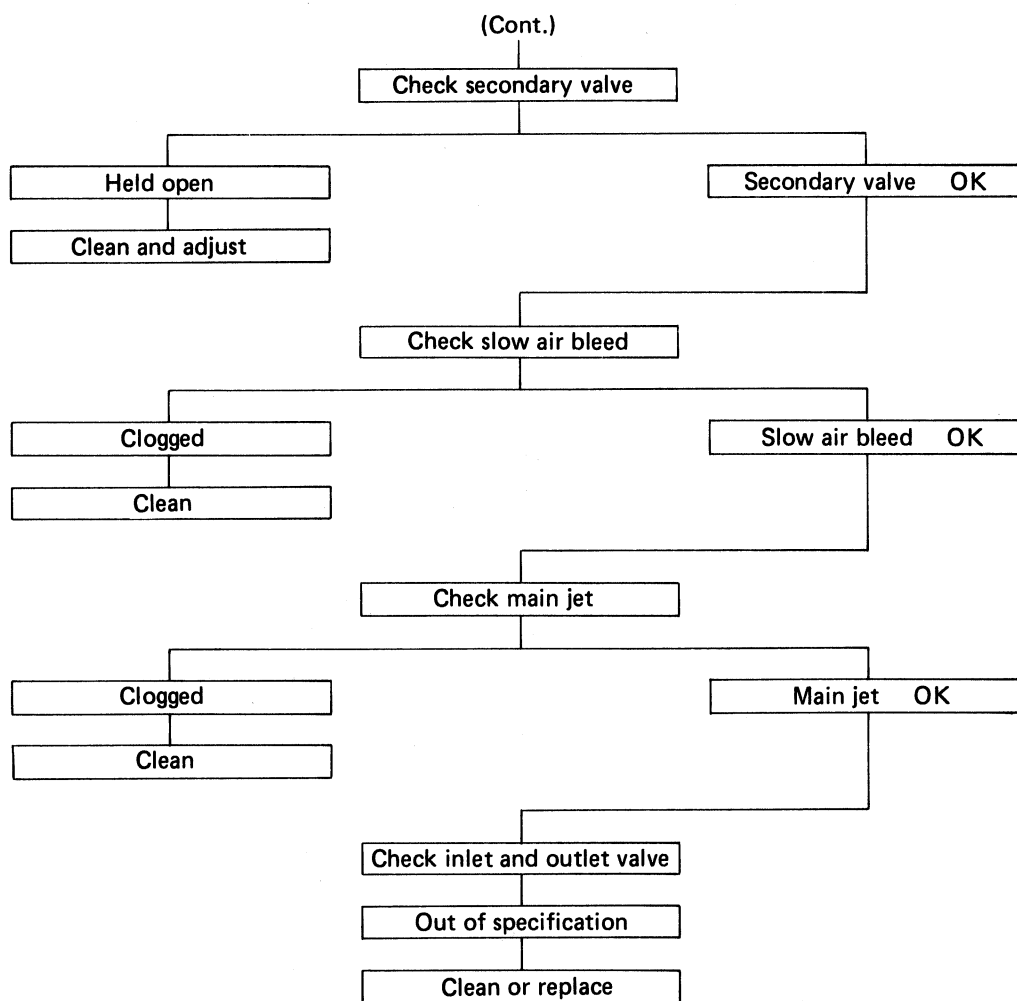
FUEL CONSUMPTION EXCESSIVE



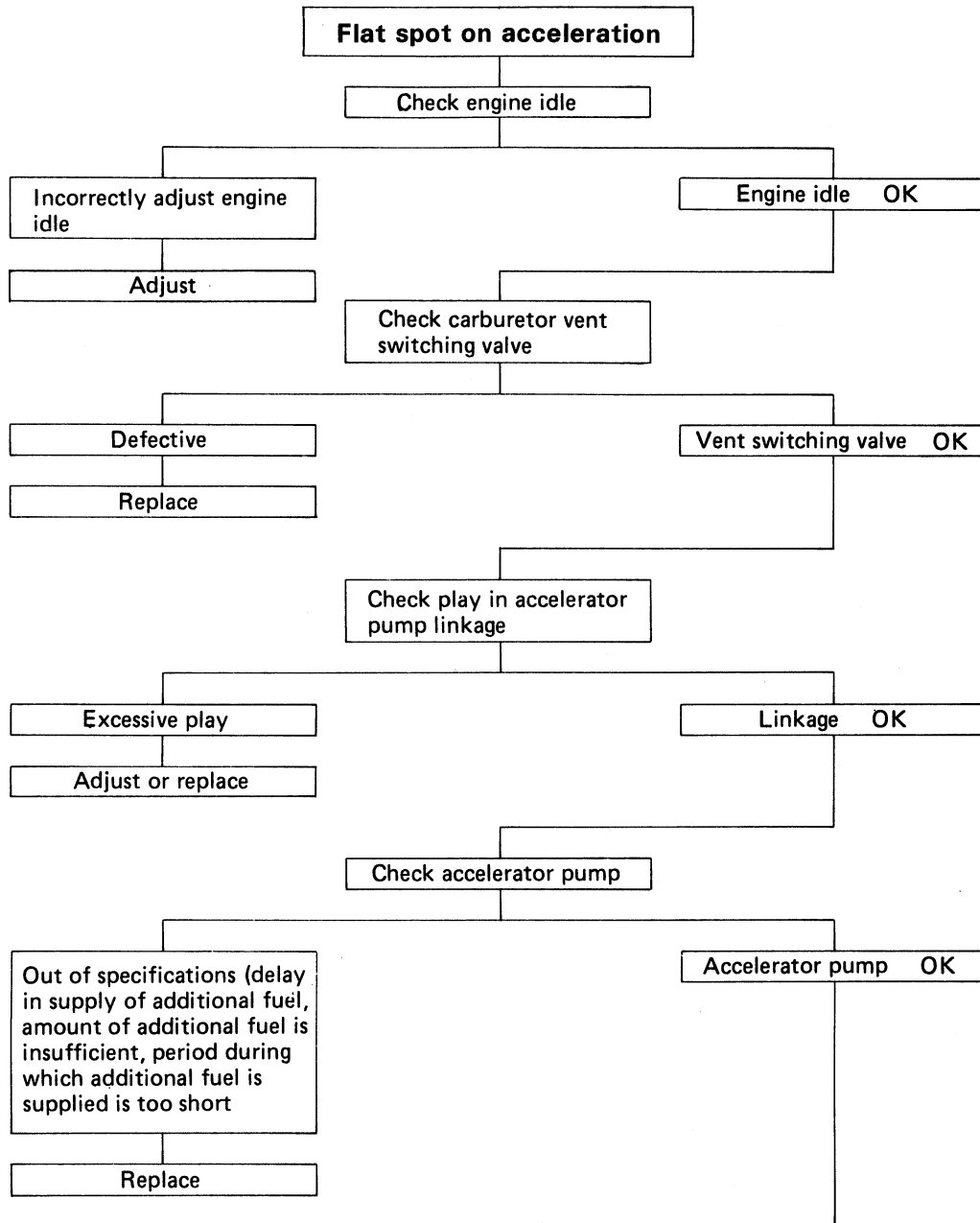
ENGINE LACKS POWER



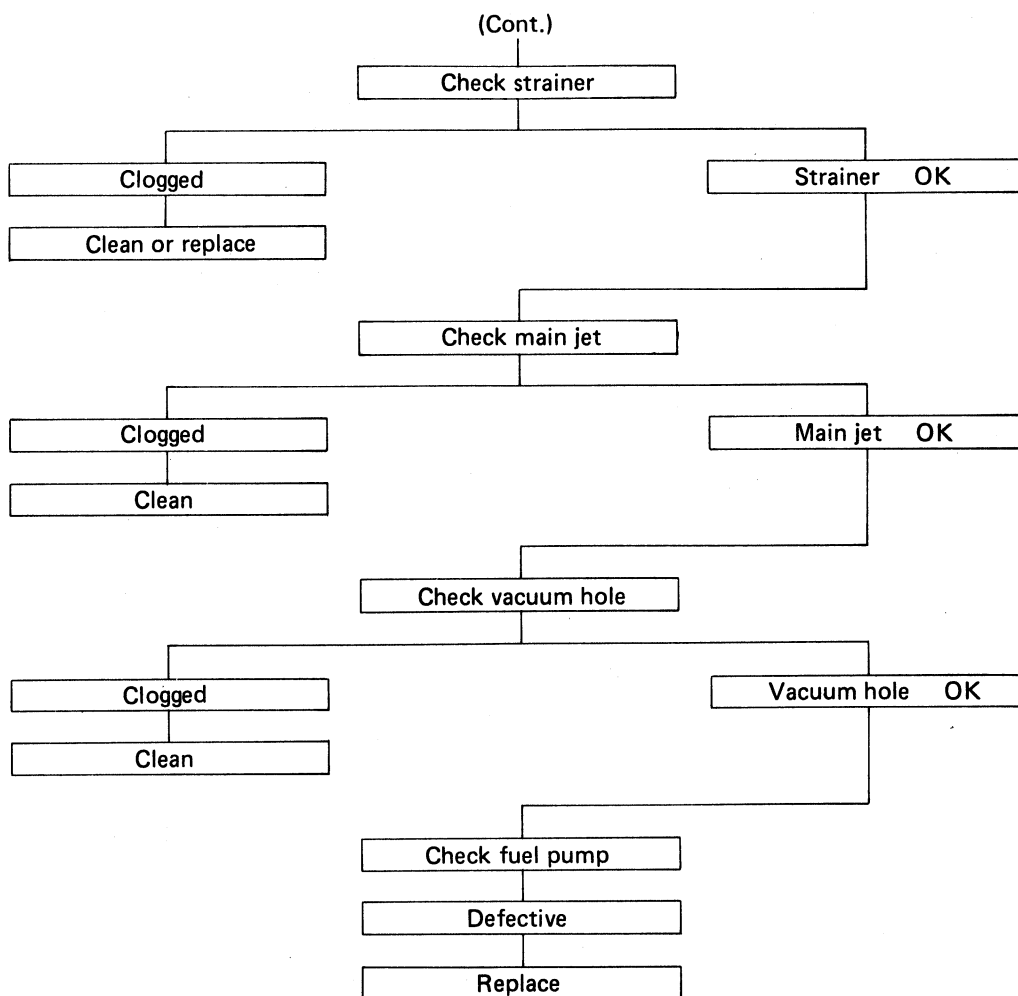
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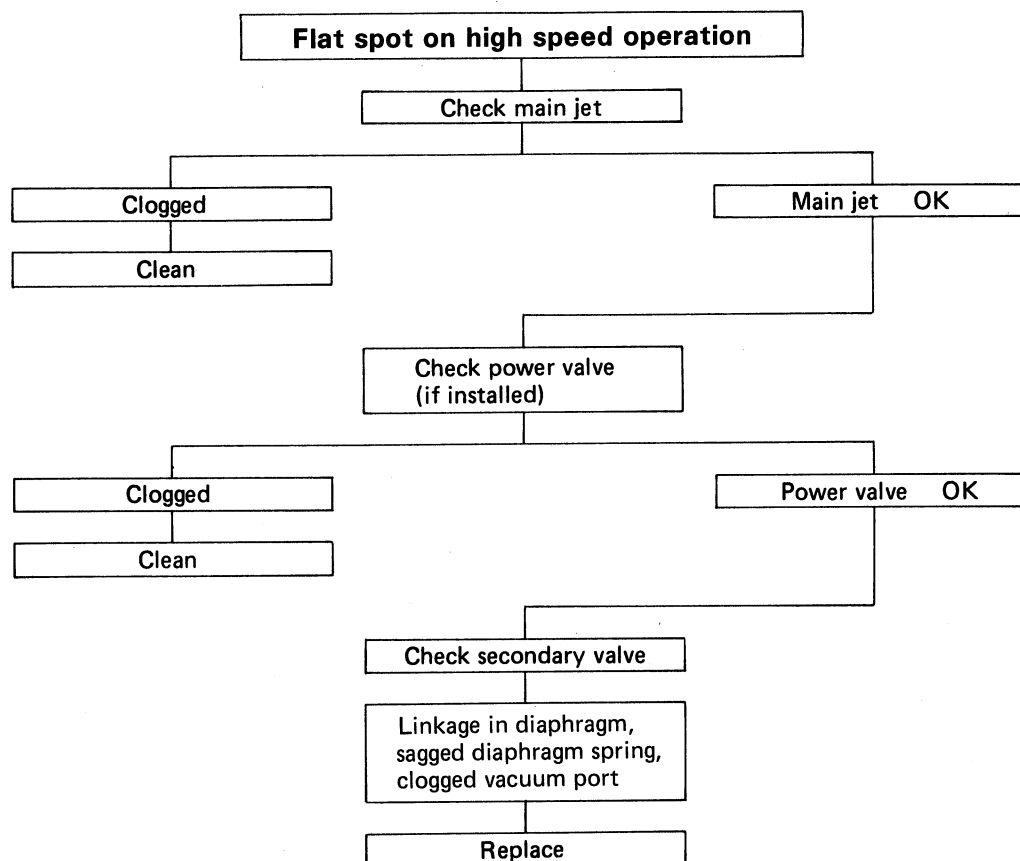
FLAT SPOT ON ACCELERATION



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FLAT SPOT ON HIGH SPEED OPERATION



SECTION 03

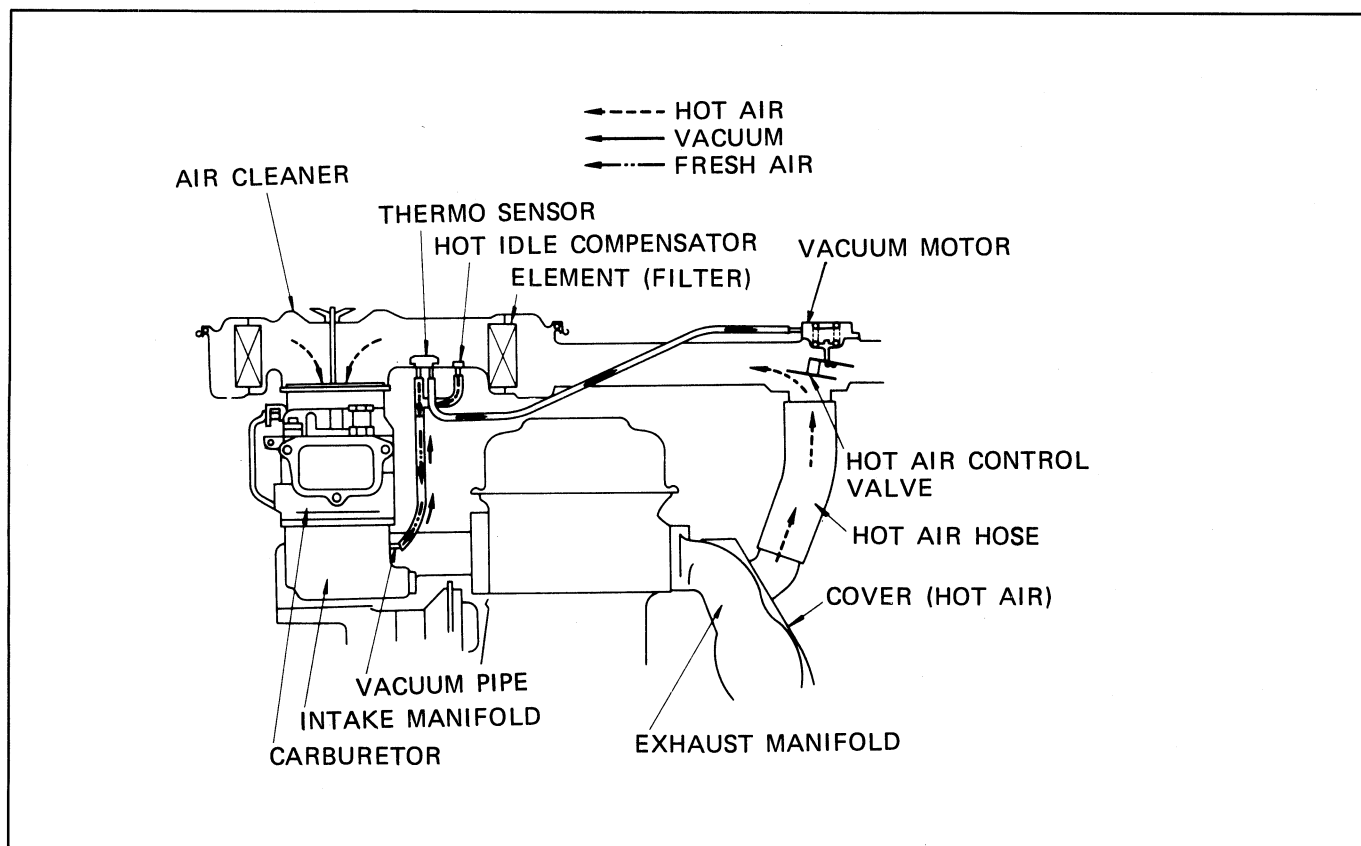
EMISSION CONTROL

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Evaporative emission control system	03-36
ON-vehicle service	03-39
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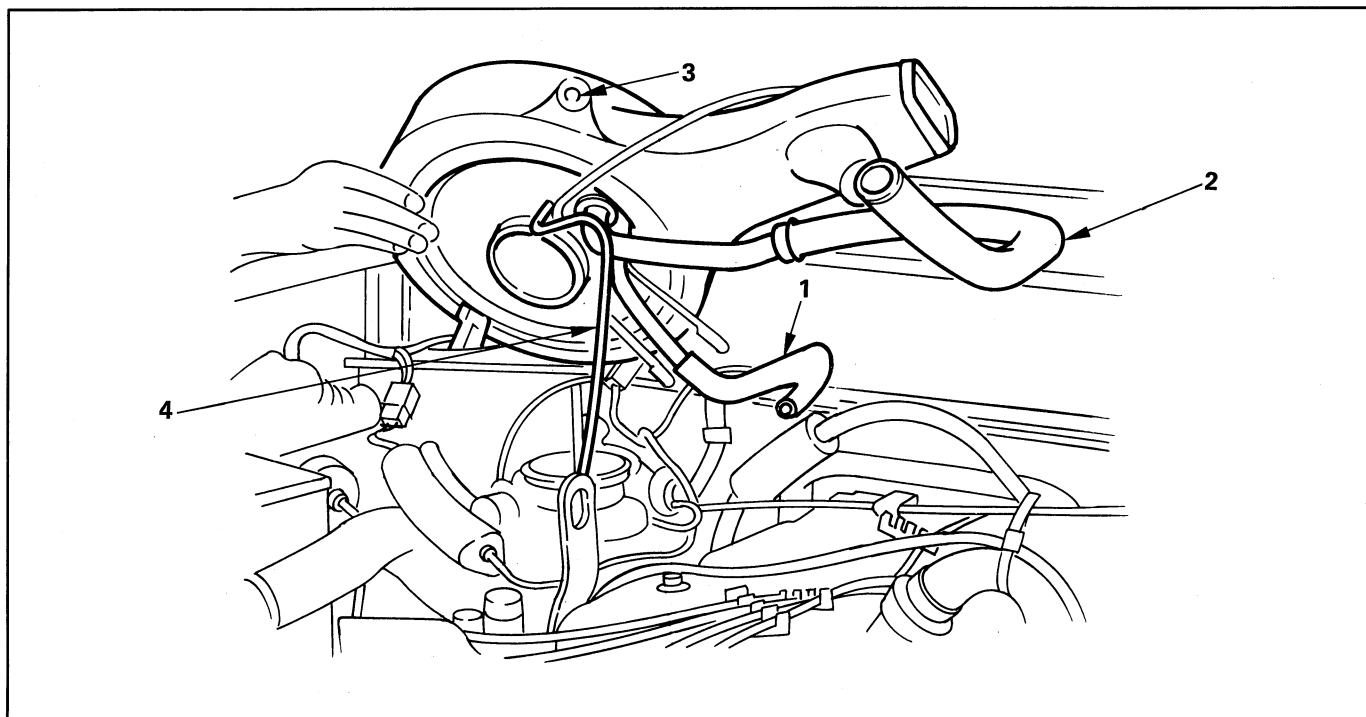
INTAKE SYSTEM

GENERAL DESCRIPTION



REMOVAL AND INSTALLATION

AIR CLEANER



Removal steps

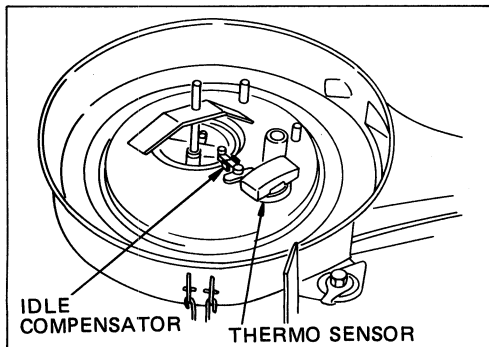
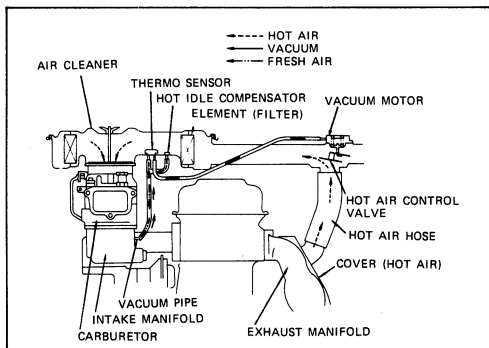
1. P.C.V. hose
2. A.I.R. hose
3. Bolts air cleaner attaching
4. T.C.A. hose

Installation steps

To install the air cleaner, reverse the removal procedure.



INSPECTION

**1. Vacuum motor, and hot air control**

With the vacuum hose, connect vacuum motor inlet pipe directly with nipple on intake manifold.

When vacuum pressure is nearly zero, look through air intake side of air cleaner. Check to be sure hot air control valve is closed completely.

Start and hold engine running at idle. Check to see if hot air switching valve closes completely. Also, check that valve works smoothly.

2. Thermo-sensor

Remove air cleaner from engine. Remove thermocouple type thermometer from sensor and replace cover. Install air cleaner in position on engine, after allowing it to cool, start engine and check for the following:

- Look through air intake side of air cleaner. Check that hot air switching valve begins to move in toward fresh air intake side, when engine is started.
- Take reading of thermocouple type thermometer when valve begins to move. Take measurement several times to obtain an average value. Thermometer reading may vary each time test is made. If measured temperature deviates from the range of 38 to 44°C (100 to 111°F), replace thermosensor assembly.

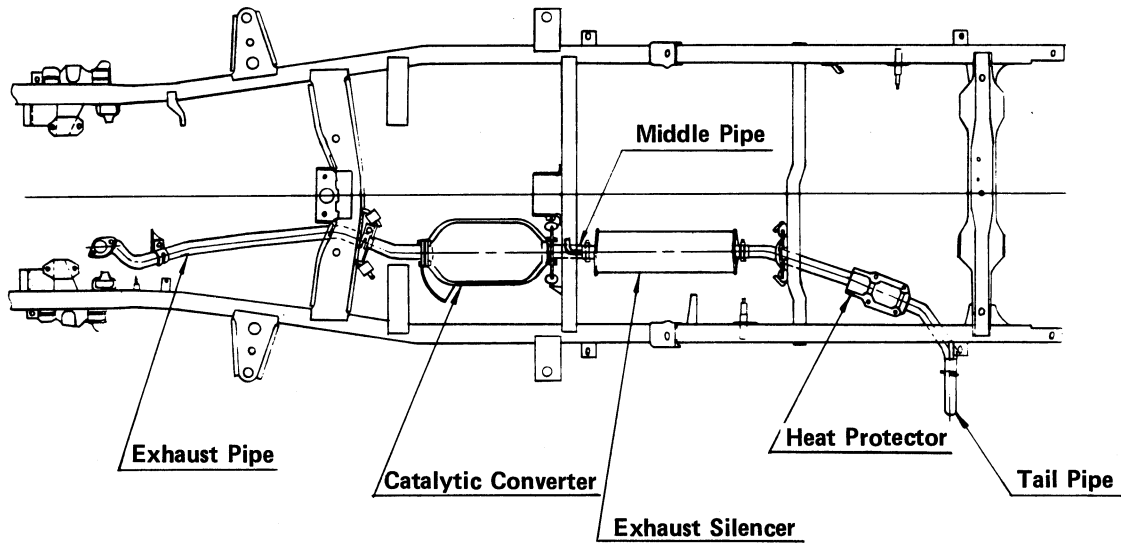
3. Hot idle compensator

- Connect a thermocouple type thermometer (J-type) to the same position it was connected when testing thermosensor.
- Start and hold engine running at idle with air cleaner cover removed, to supply hot air to idle compensator.

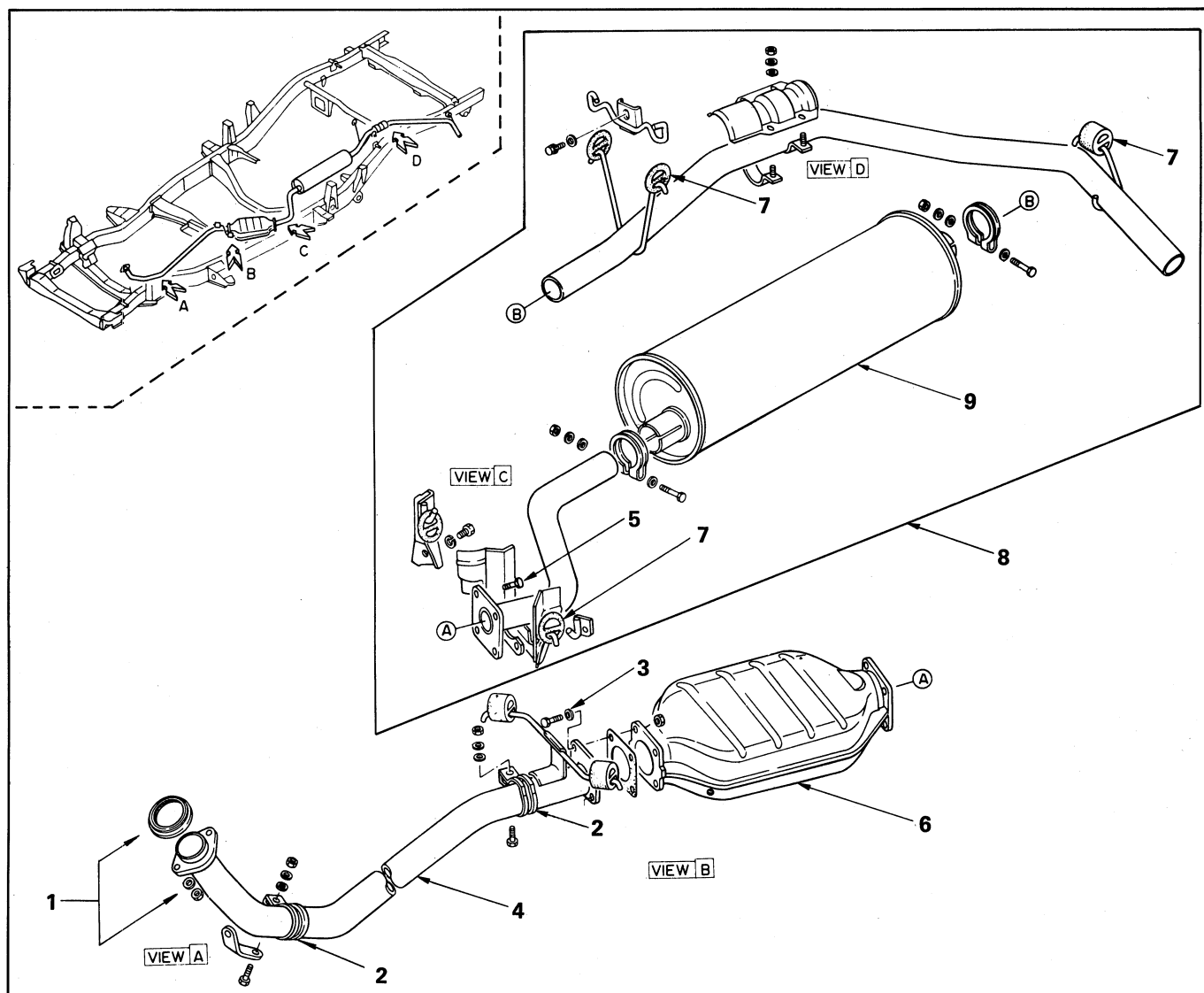
Read thermometer when hot idle compensator begins to work. When hot idle compensator begins to function, operation is accompanied by a sound of outside air intake. The hot idle compensator is normal if actuating temperature is between 46 and 52°C (115 and 126°F).

EXHAUST SYSTEM

GENERAL DESCRIPTION



↔ → REMOVAL AND INSTALLATION



Removal steps

Before exhaust system removal, raise the vehicle

1. Nuts ; attaching the front pipe to exhaust manifold
2. Bolts ; attaching the front pipe bracket to the transmission and the 3rd cross member
3. Bolts ; attaching the front pipe to the catalytic converter
4. Front pipe
5. Bolts ; attaching the center pipe to the catalytic converter and catalytic converter
6. Catalytic converter
7. Rubber rings
8. Center pipe, rear pipe and silencer
9. Silencer assembly

Installation steps

To install, reverse the removal procedures

Note:

Apply muffler sealer to the joining portion of the pipes.



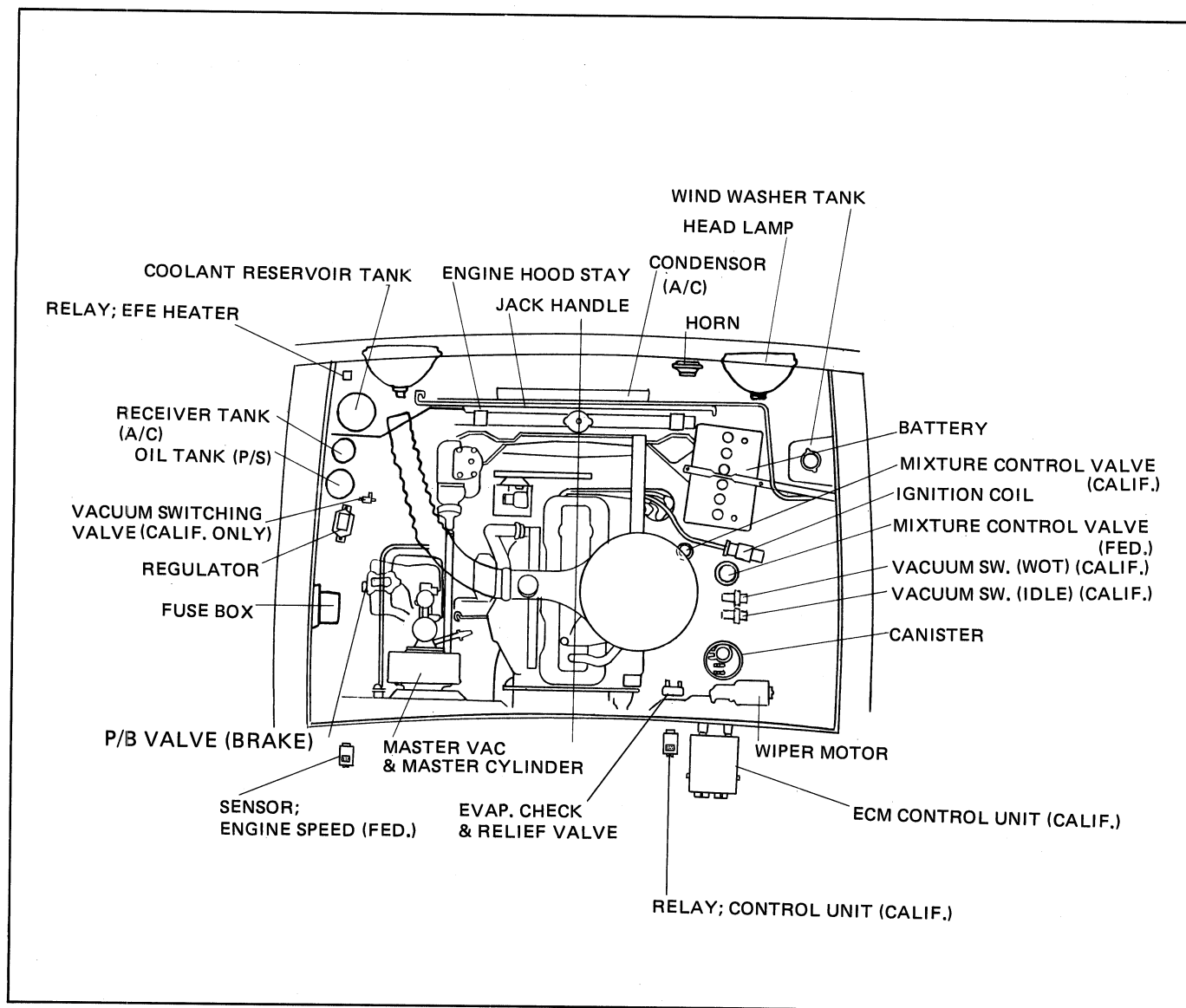
INSPECTION AND REPAIR

1. Pipes and rubber rings

- Check the pipes for corrosion, craching, damage or misalignment and repair as required.
- Check the rubber rings for deterioration or damage and repair as required.

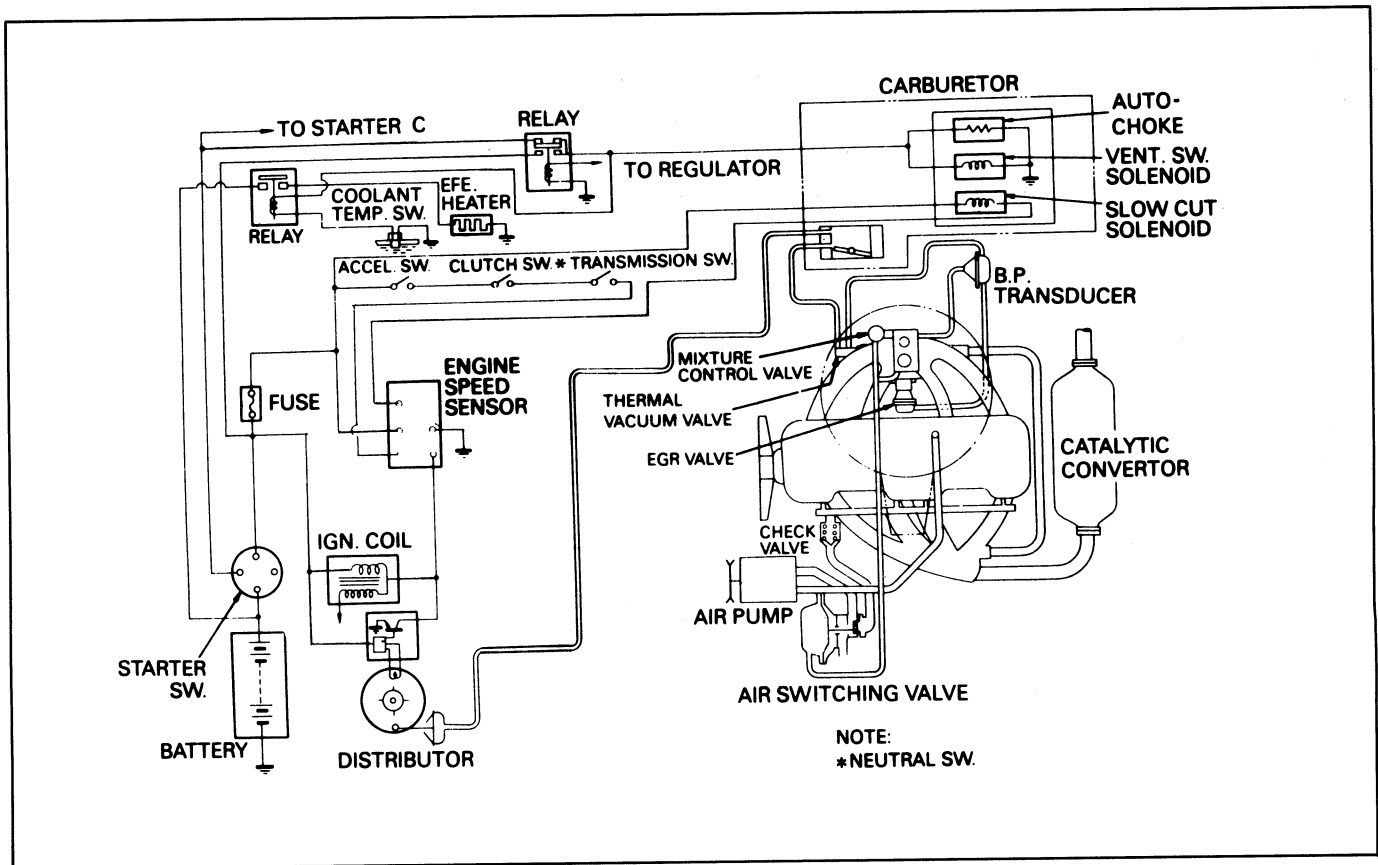
EMISSION CONTROL SYSTEM

GENERAL DESCRIPTION



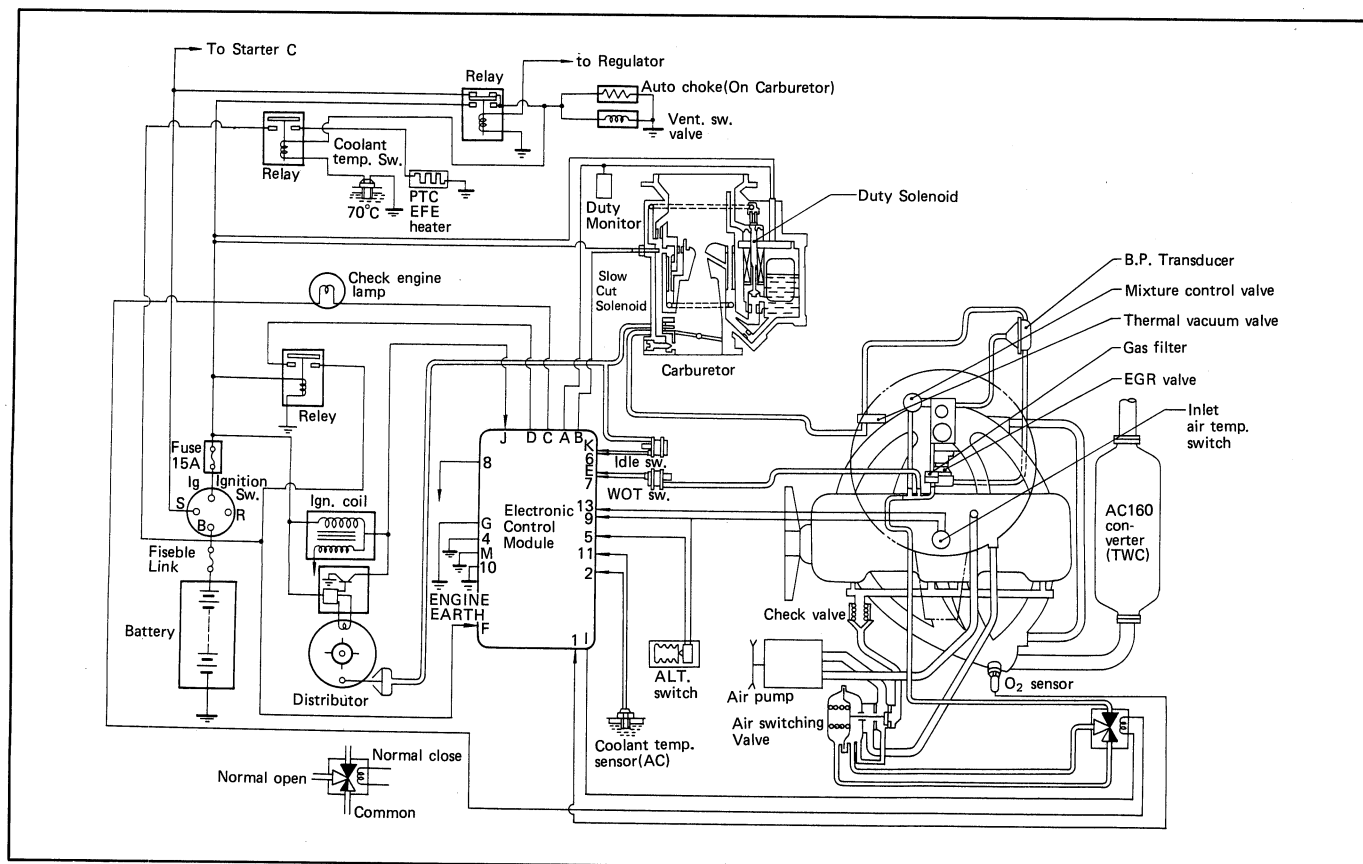
SYSTEM DIAGRAM

FEDERAL



The emission control system is designed to prevent discharging of harmful gases directly into the open air. The emission control system consists of: of an Air Injection Reactor (AIR) System. an Exhaust Gas Recirculation (EGR) System, a Thermostatically Controlled Air (TCA) Induction System, a Positive Crankcase Ventilation (PCV) System and an Evaporative Emission Control (EEQ) System.

CALIFORNIA

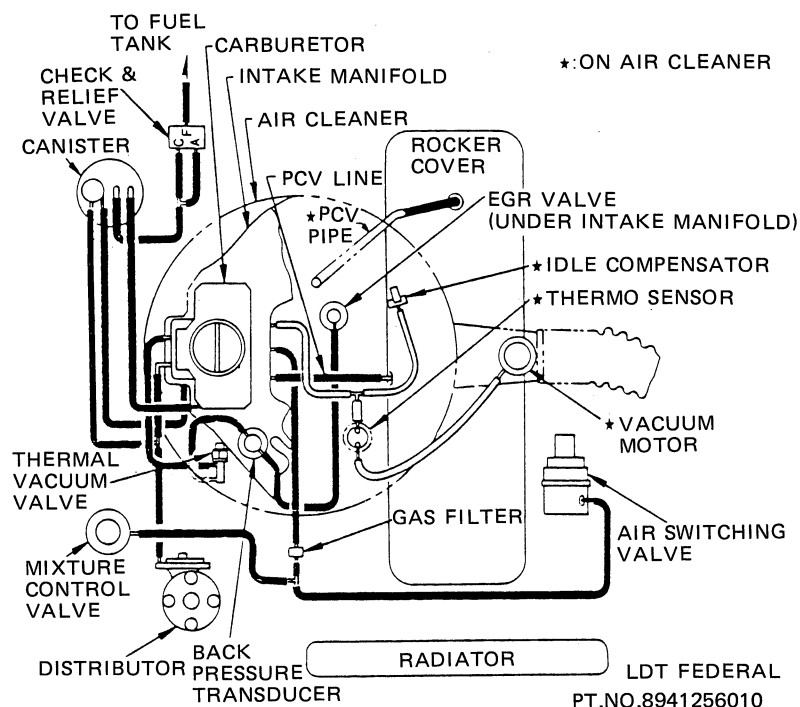


The California emission control system consists of an Air Injection Reactor (AIR) System, (ECM controlled), an Exhaust Gas Recirculation (EGR) System, a Thermostatically Controlled Air (TCA) Induction System, Positive Crankcase Ventilation (PCV) System, an Evaporative Emission Control System (EEC) and a Closed Loop emission control system.

The Closed Loop emission control is a system that precisely controls the air-fuel ratio near stoichiometry, allowing the use of a three-way catalyst to reduce oxides of nitrogen and oxidize hydrocarbons and carbon monoxide.

The essential components are an exhaust gas oxygen sensor, an electronic control module (ECM), a controlled air fuel ratio carburetor and a three-way catalytic converter.

VACUUM HOSE ROUTING DIAGRAM

FEDERAL

CALIFORNIA

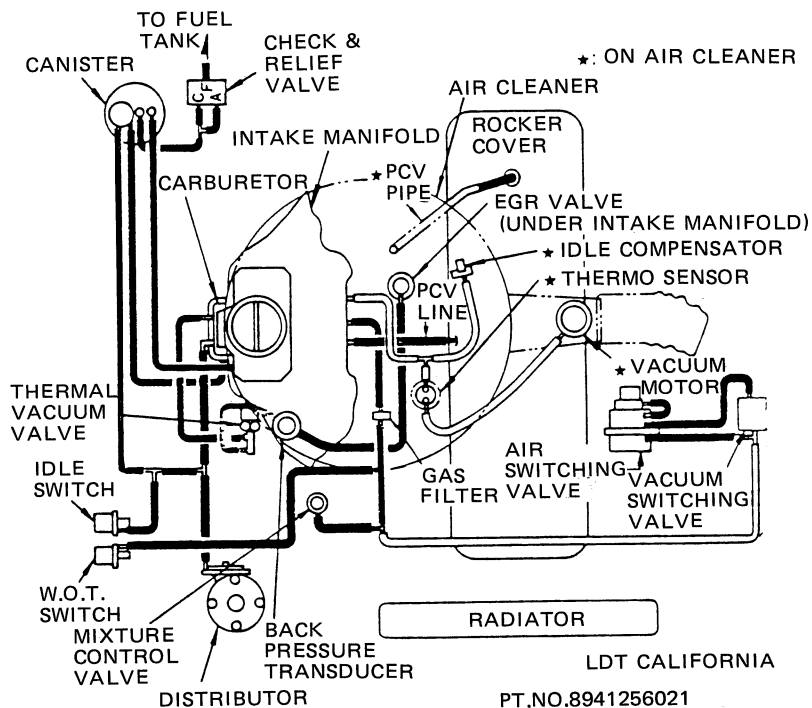


CHART OF EMISSION SYSTEM

Control system \ Certification classification	Federal	California
Air Injection Reactor System (AIR)	Yes	Yes
Exhaust Gas Recirculation System (EGR) Backpressure Type	Yes	Yes
Catalytic Converter	Oxidizing Catalyst (OC)	Three Way Catalyst (TWC)
Closed Loop Emission Control System	None	Yes
Thermostatically Controlled Air Cleaner (TCA)	Yes	Yes
Early Fuel Evaporation System (EFE)	Yes	Yes
Coasting Fuel Cut	Yes	Yes Included in Closed Loop Emission Control System
High altitude emission control system	Yes	None
Positive Crankcase Ventilation System (PCV)	Yes	Yes
Evaporation Control System (ECS)	Yes	Yes

MAIN DATA AND SPECIFICATIONS

AIR INJECTION REACTOR SYSTEM		
Air pump data		
Construction		Positive displacement type
Number of vanes		2
Maximum speed	rpm	7000
Relief valve opening pressure	kg/cm ² (psi)	0.2 to 0.35 (2.84 — 4.98)
EXHAUST GAS RECIRCULATION SYSTEM		
EGR valve operating negative pressure		
Starting	mmHg(in.Hg)	48 (1.9)
Fully opened	mmHg(in.Hg.)	120 (4.7) for Fed. 99.8 (3.9) for Cal.
Thermal vacuum valve opening temperature	°C (°F)	Over 46 to 54 (115 to 129)
Back pressure transducer pressure	mm Aq(in. Aq)	50 (2)
OXIDIZING CATALYTIC CONVERTER SYSTEM (Federal only)		
THREE-WAY CATALYTIC CONVERTER SYSTEM (California only)		
Converter size	mm(in.)	431 x 228 x 89 (16.98 x 8.98 x 3.5)
(Length x Width x Thickness)		
Converter volume	liters(Cu.in.)	2.6 (160)
Converter weight (with catalyst)	kg(lbs.)	8.2 (18)
Catalyst size	mm(in.)	Pellet 3.2 (1/8) min., 6.4 (1/4 in.) max.
THERMOSTATICALLY CONTROLLED AIR CLEANER SYSTEM		
Thermo sensor operating temperature		
Starting	°C (°F)	38 (100)
Fully opened	°C (°F)	44 (111)
Idle compensator operating temperature		
Starting	°C (°F)	46 (115)
Fully opened	°C (°F)	52 (126)
EVAPORATIVE CONTROL SYSTEM		
Check and relief valve operating pressure		
Check valve open negative pressure	mmHg (in.Hg)	25.4 to 35.5 (1.0 to 1.4)
Relief valve open negative pressure	mmHg (in.Hg)	5.0 to 15.2 (0.2 to 0.6)
Canister purge control valve operating pressure		
Purge control valve open	mmHg (in.Hg)	180 to 220 (7.1 to 8.7)

CLOSED LOOP EMISSION CONTROL SYSTEM

Vacuum switch (idle position)	Carburetor ported vacuum	Electrical signal to ECM	'ON' ; $\leq 63 \begin{smallmatrix} +5 \\ -6 \end{smallmatrix}$ mmHg (Q) 'OFF' ; $\geq Q \begin{smallmatrix} +15 \\ 0 \end{smallmatrix}$ mmHg
Vacuum switch (WOT)	Manifold vacuum	Electrical signal to ECM	'ON' ; $\leq 63 \begin{smallmatrix} +5 \\ -6 \end{smallmatrix}$ mmHg (Q) 'OFF' ; $\geq Q \begin{smallmatrix} +15 \\ 0 \end{smallmatrix}$ mmHg
Thermo switch	Engine coolant temp.	Electrical signal to ECM	'OFF' ; $\geq 50 \pm 3^\circ\text{C}$ (T_1) 'ON' ; $\leq T_2, 43^\circ\text{C} \leq T_2 \leq T_1$
Oxygen sensor	Oxygen content in exhaust gas stream	Voltage to ECM	'Rich' ; ≥ 800 mV #1 'Lean' ; ≤ 250 mV at 37.1°C & 450 mV BIAS
Altitude switch	Atmospheric pressure	Electrical signal to ECM	'ON' ; $\leq 575 \pm 15$ (P) 'OFF' ; $\geq P \begin{smallmatrix} +33 \\ +8 \end{smallmatrix}$ mmHg
Inlet air temperature switch	Inlet air temperature	Electrical signal to ECM	'ON' ; $\leq 0 \pm 4^\circ\text{C}$ 'OFF' ; $\geq 15^\circ\text{C}$

EXHAUST EMISSION CONTROL SYSTEM

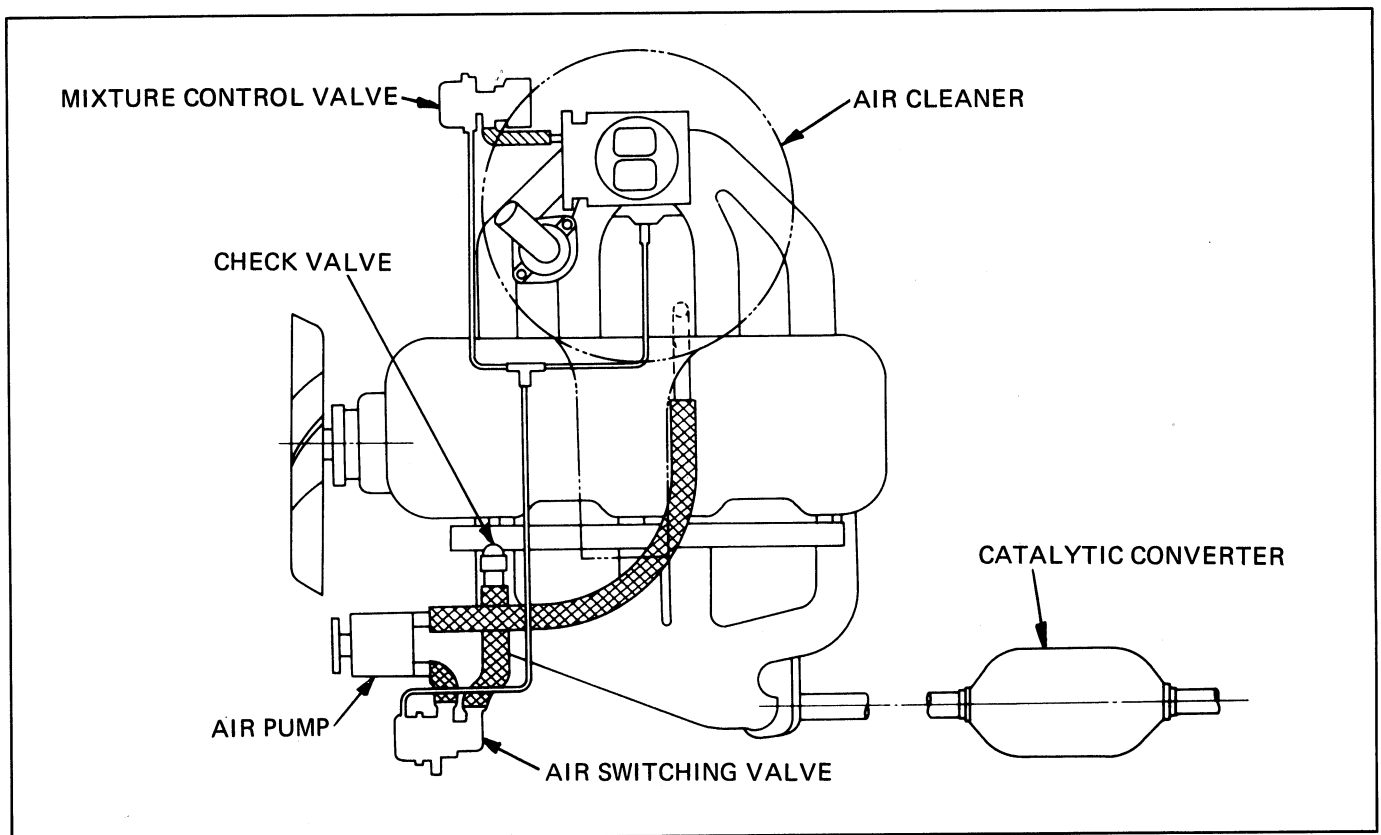
AIR INJECTION REACTOR SYSTEM (AIR)

The Air Injection Reactor System consists principally of an air pump, a check valve, a mixture control valve, an air switching valve and an air manifold with air injection nozzles.

The air pump transmits filtered air received from the air cleaner assembly, through the air switching valve and the check valve, into an air manifold assembly which is mounted on the cylinder head. As the hot exhaust gas comes out from the combustion chamber, it meets with a blast of air from the air injection nozzle located in the exhaust port to burn some part of hydrocarbon and carbon monoxide emissions.

Upon receiving a high vacuum signal from intake manifold, the mixture control valve introduces ambient air through air filter into the intake manifold to dilute the momentarily rich fuel mixture that occurs on initial throttle closing. This eliminates backfire.

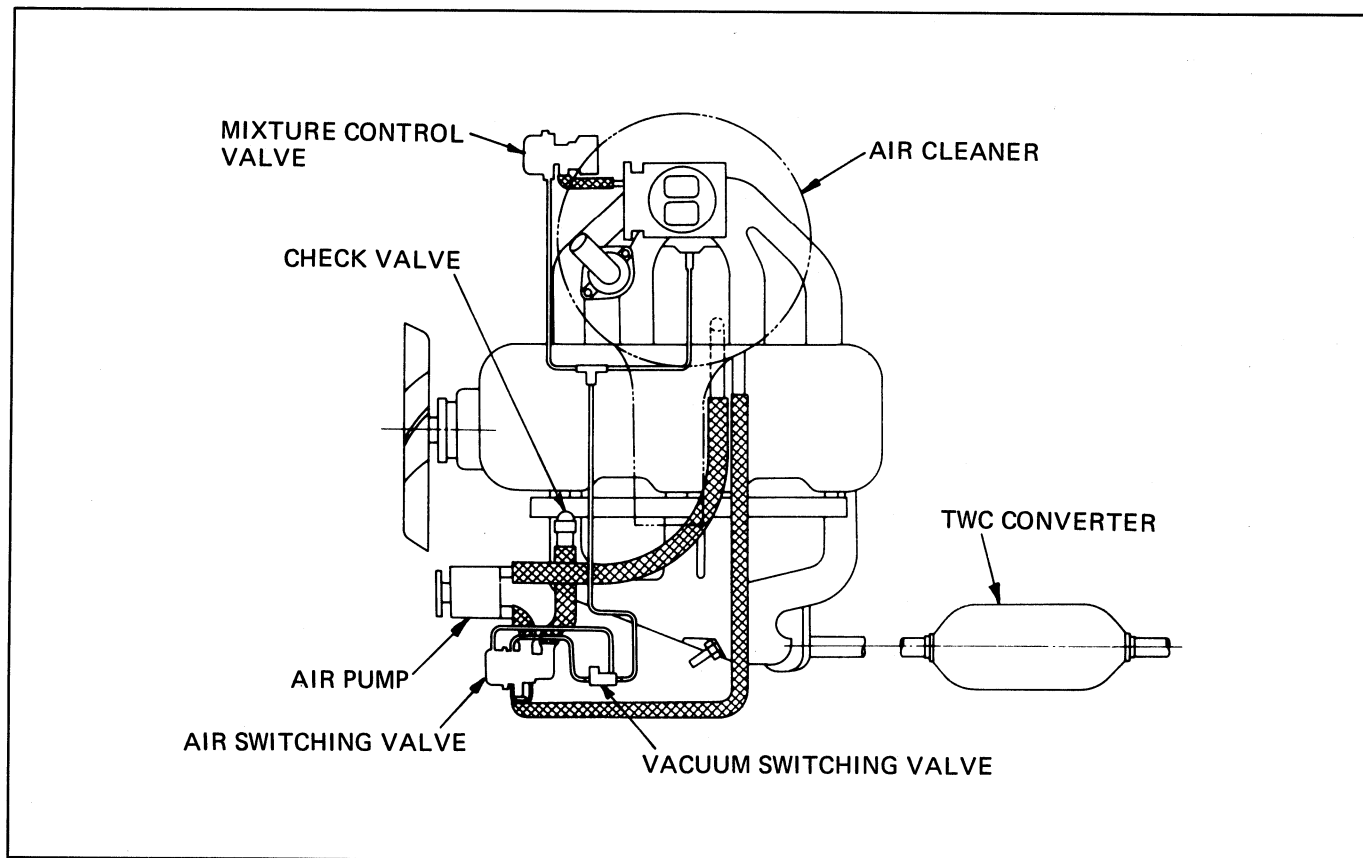
FEDERAL



During heavy engine load conditions (near W.O.T.), the air switching valve diverts the air from the air pump to the atmosphere to prevent a possible converter overtemperature condition. This function is activated at a specified intake manifold vacuum.

The check valve is a one-way valve which prevents exhaust gas to enter the air pump and to damage it, if the pump were out of operation for any reason (such as drive belt failure).

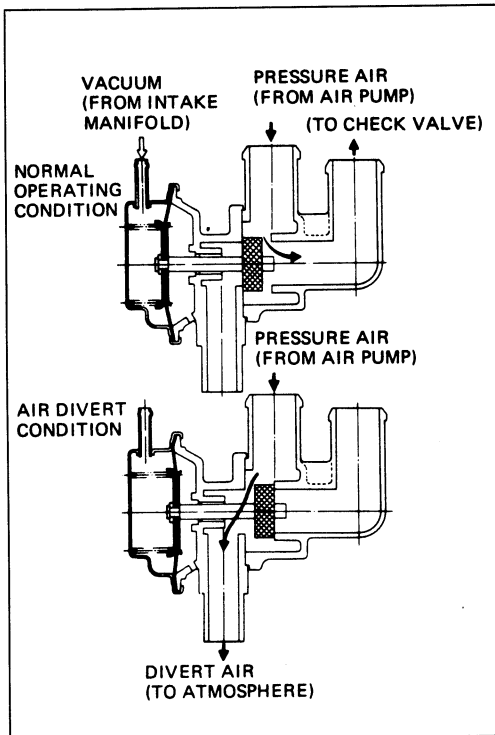
CALIFORNIA



Air switching valve (diverter valve) switches air passage from the air pump through a vacuum switching valve actuated by an electric signal supplied from the electronic control module in the closed loop system. The air switching valve is open to allow the injection of the air into the exhaust port of the engine when:

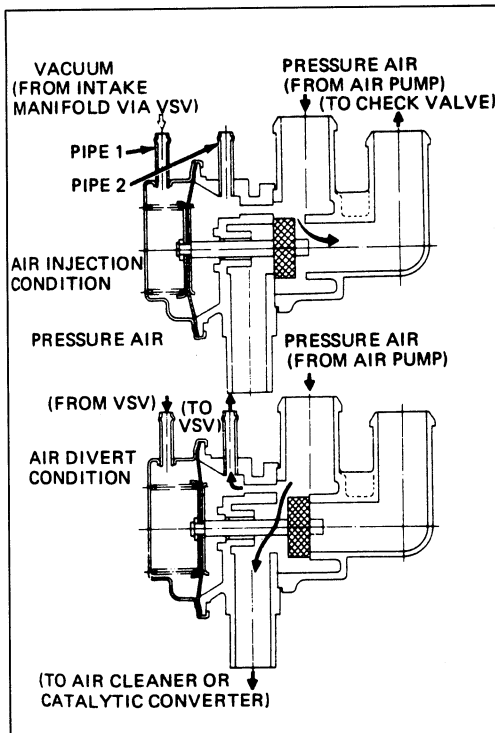
- the temperature of the coolant is below the specified level or
 - during a certain period of time after the accelerator comes up to WOT condition.
- In the conditions other than the above, the switched air is diverted to air cleaner.

AIR SWITCHING VALVE



Federal

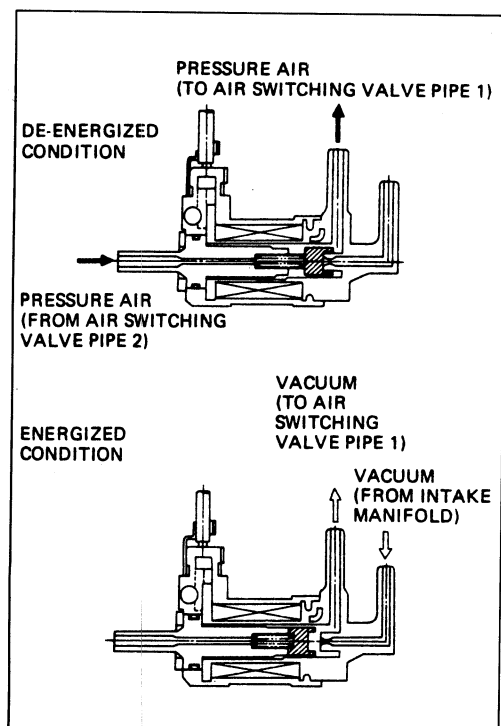
This valve is designed to switch air flow from the air pump, and is operated by intake manifold vacuum. When the manifold vacuum is at a higher level than the specified value, this valve moves the air from the air pump to the check valve, when the manifold vacuum reaches a lower level than the specified value, the air valve shuts the air passage to the check valve, and at the same time opens the port to the atmosphere, so the air from the air pump is diverted to the atmosphere.



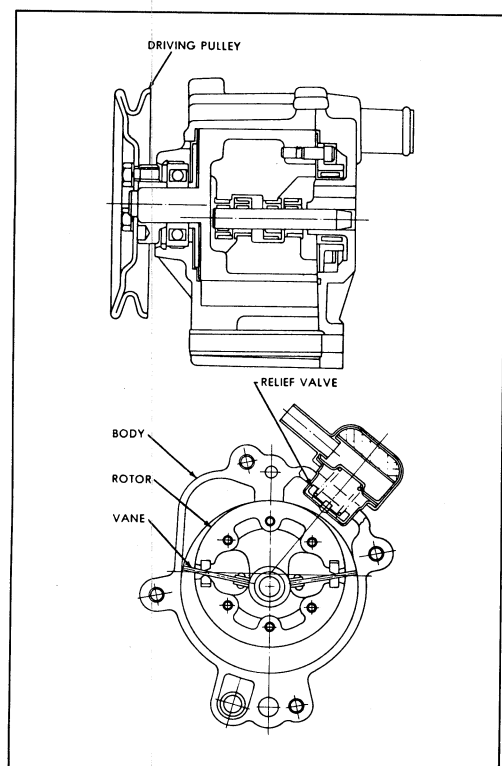
California

This valve is designed to switch air flow from the air pump, and is operated by manifold vacuum and air pump pressure which are switched by a VACUUM SWITCHING VALVE (3-way valve). While manifold vacuum flows to the pipe (1) through the vacuum switching valve, this valve moves the air from the air pump to the check valve. When air pump pressure flows to the pipe (1) switched by the VACUUM SWITCHING VALVE, the air valve shuts the air passage to the air manifold, and at the same time opens the port to the air cleaner, so the air from the air pump flows to the air cleaner.

VACUUM SWITCH VALVE (California only)



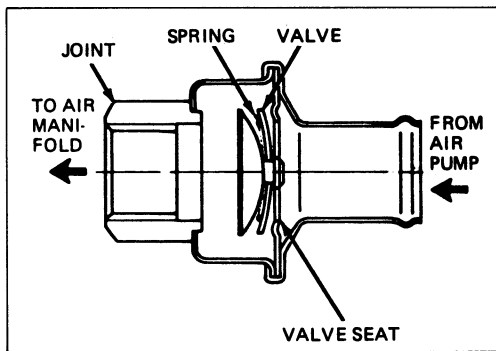
AIR PUMP



The air pump consists principally of the pump body, cover rotor, vanes and press-fit relief valve. The pump is belt-driven by the pulley mounted on the water pump shaft of the engine.

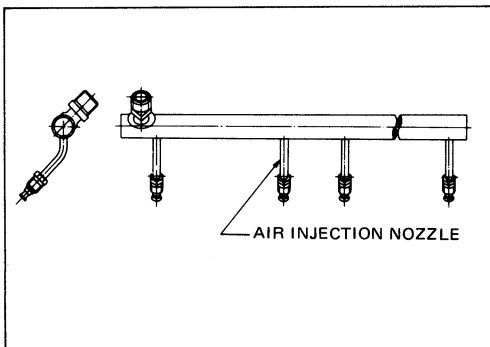
Air is drawn through the air cleaner and suction hose into the pump suction chamber, where it is trapped between two vanes and the pump body. As the rotor turns, these vanes carry the air to the outlet chamber and then to the air manifold. The relief valve, press-fitted into position on the outlet chamber, is held closed under normal operating conditions by means of the spring. However, when the pressure of air at the outlet overcomes the tension of the spring, the valve is pushed open and releases excess air so it will not exceed the outlet air pressure of the pump.

CHECK VALVE



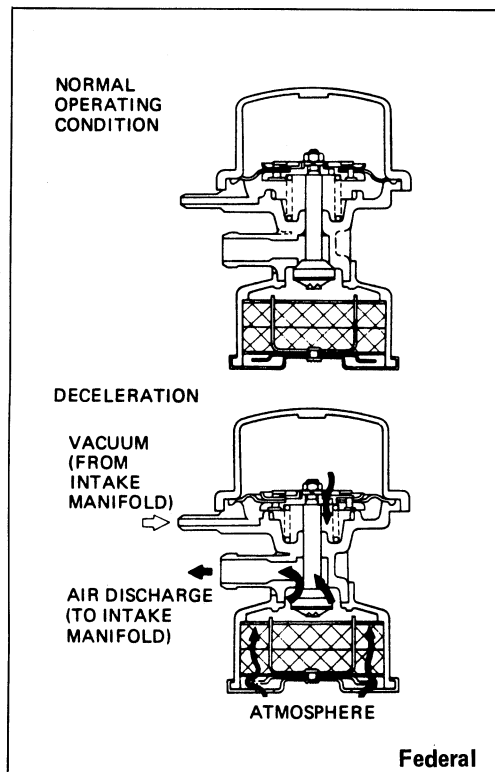
The check valve is designed to allow air to pass through in only one direction. The valve is pushed open when the pressure of air supplied from the air pump overcomes the valve spring tension, but closes with the counterflow of exhaust gas from the manifold. This arrangement safeguards the air pump and hoses against damage when the air supply from the air pump is stopped, due to a broken drive belt when backfiring occurs within the exhaust system, causing high temperature exhaust gases to flow in a reverse direction.

AIR MANIFOLD AND AIR INJECTION NOZZLE



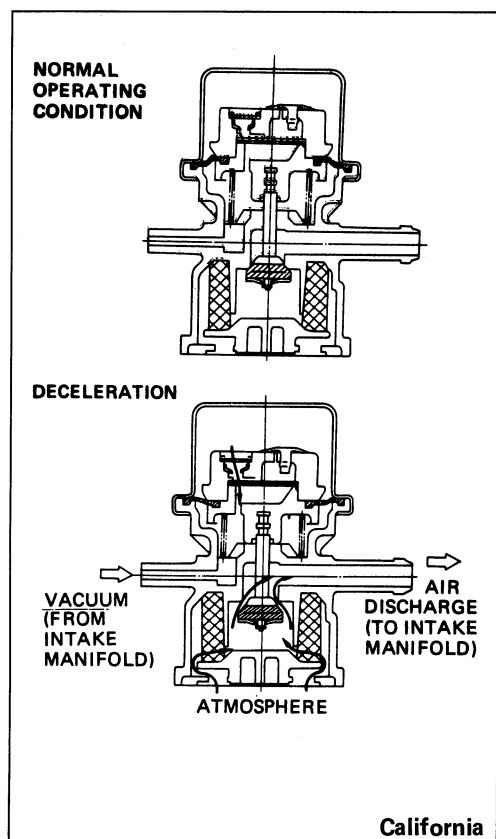
Pressurized air from the AIR pump is fed through the check valve, into the air manifold, where it is distributed to the nozzles. The nozzles are installed in position near the exhaust valves and pointed toward the valve. Thus, air is continuously injected into the exhaust manifold while the engine is running.

MIXTURE CONTROL VALVE

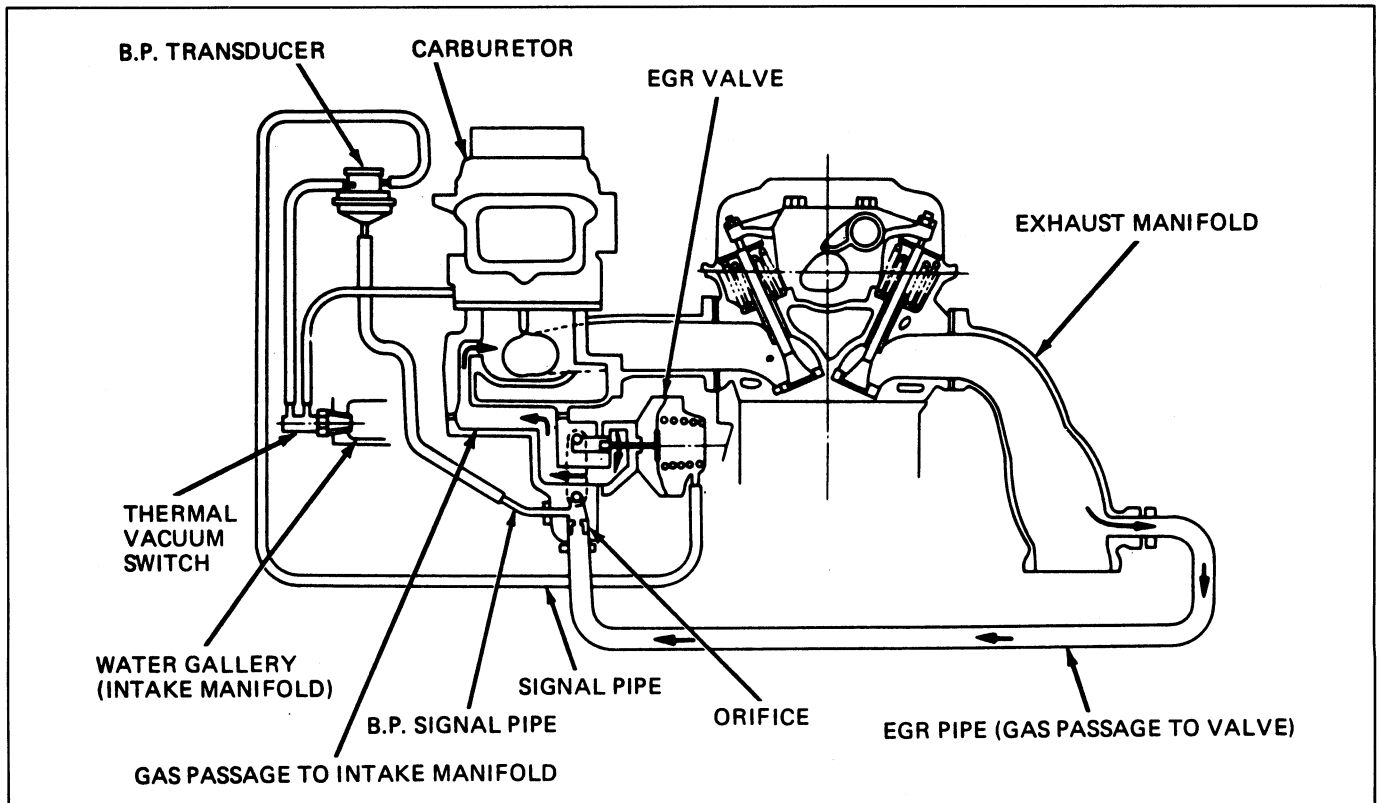


The purpose of the mixture control valve (deceleration valve) is to prevent backfiring in the exhaust system during deceleration. The mixture control valve is designed to supply air to the intake manifold to prevent over-enriching of the air-fuel mixture, when the throttle valve in the carburetor is suddenly closed.

The mixture control valve is held closed under normal operating conditions. When the vacuum in the intake manifold increases rapidly, the valve opens, allowing the air from the air pump into the intake manifold.



EXHAUST GAS RECIRCULATION SYSTEM (EGR)

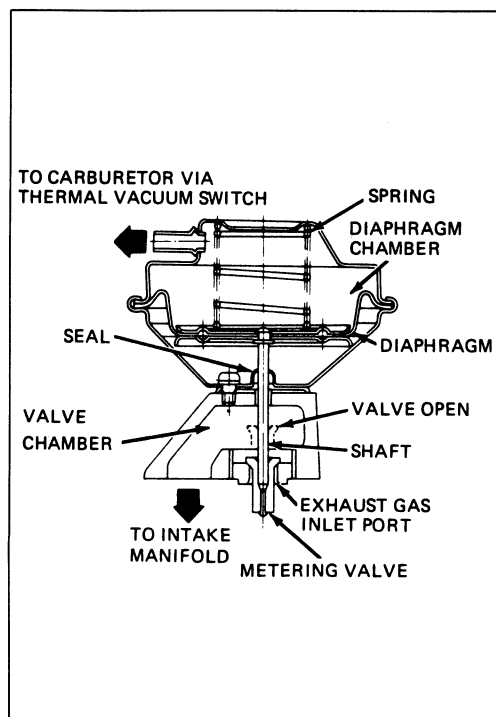


The Exhaust Gas Recirculation (EGR) system is used to reduce combustion temperatures in the combustion chamber, thereby reducing oxides of nitrogen emissions.

The exhaust gas is drawn into the intake manifold through a steel pipe and EGR valve from the exhaust manifold. The vacuum diaphragm of the EGR valve is connected to a signal port at the carburetor flange through a Back Pressure Transducer responsive to exhaust pressure to modulate the vacuum signal and a thermal vacuum valve which operates for EGR cold override.

As the carburetor throttle valve is opened, a vacuum is applied to the diaphragm, which opens the EGR valve and allows exhaust gas to be metered into the intake manifold.

EGR VALVE

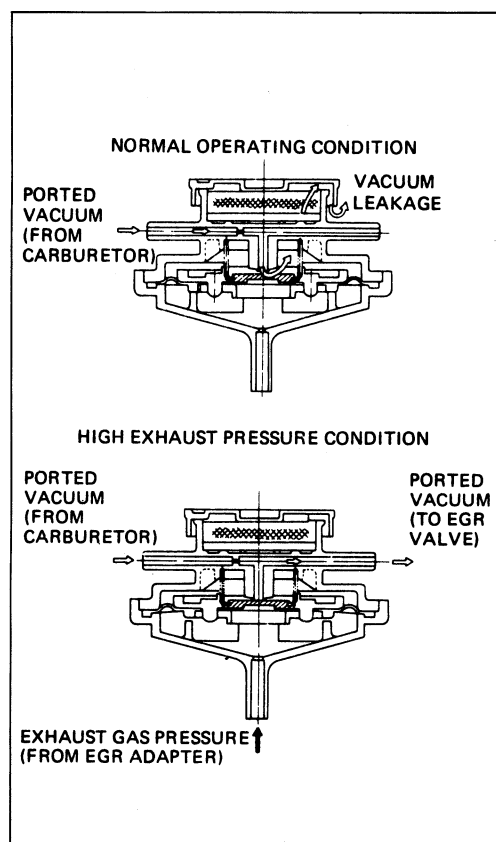


The EGR valve is mounted under the intake manifold and controls the exhaust gas flow drawn into the intake manifold from the exhaust manifold.

The vacuum diaphragm chamber is connected to the vacuum port in the carburetor flange through the thermal vacuum valve and a B.P. Transducer. As the throttle valve is opened, a vacuum is applied to the vacuum diaphragm. When the vacuum reaches the specified value, the diaphragm moves against the spring force and is in the fully up position at the specified value of vacuum.

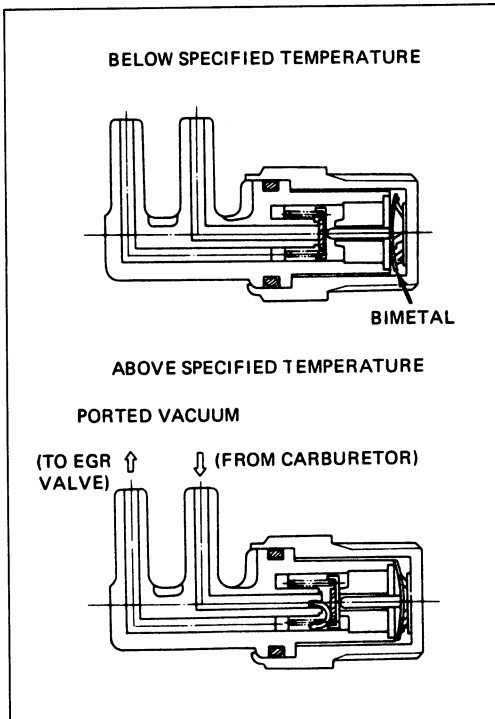
As the diaphragm moves up, it opens the exhaust gas metering valve, thus allowing exhaust gas to be pulled into the engine intake.

BACK PRESSURE TRANSDUCER



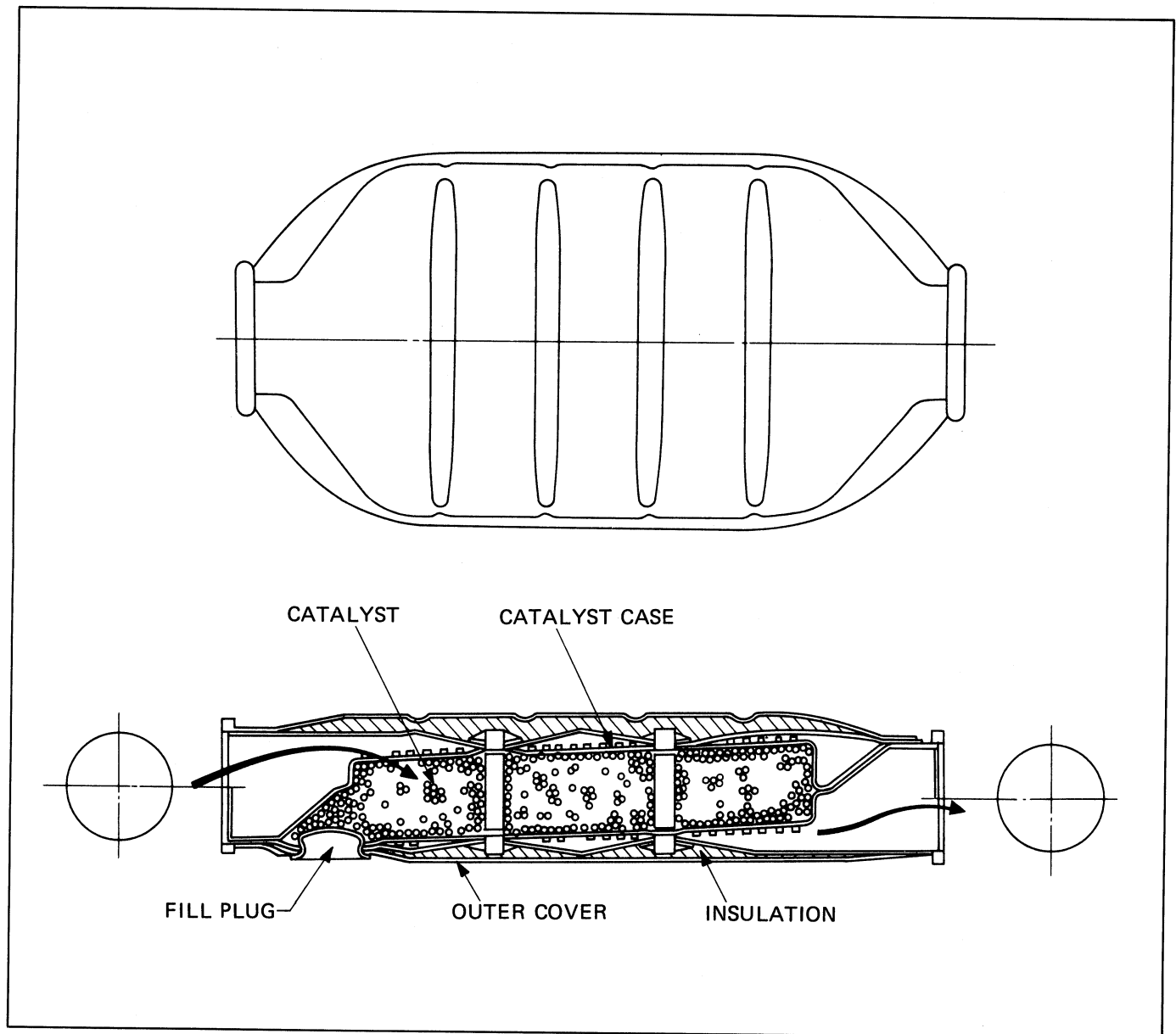
The B.P. Transducer is mounted as shown in Figure 6E-12, and is responsive to exhaust pressure. Under normal operating conditions, ported vacuum leaks into the atmosphere and is applied to the EGR valve under high pressure conditions thereby modulating volume of recirculating exhaust gas.

THERMAL VACUUM VALVE



The thermal vacuum valve is mounted on the intake manifold and is connected in series between the vacuum port in the carburetor and the EGR valve. When the coolant temperature is below 46°C to 54°C (115°F to 129°F) the valve is closed and the EGR system does not operate. When the coolant temperature is above 46°C to 50°C (115°F to 129°F) or the valve is opened and the EGR system operates.

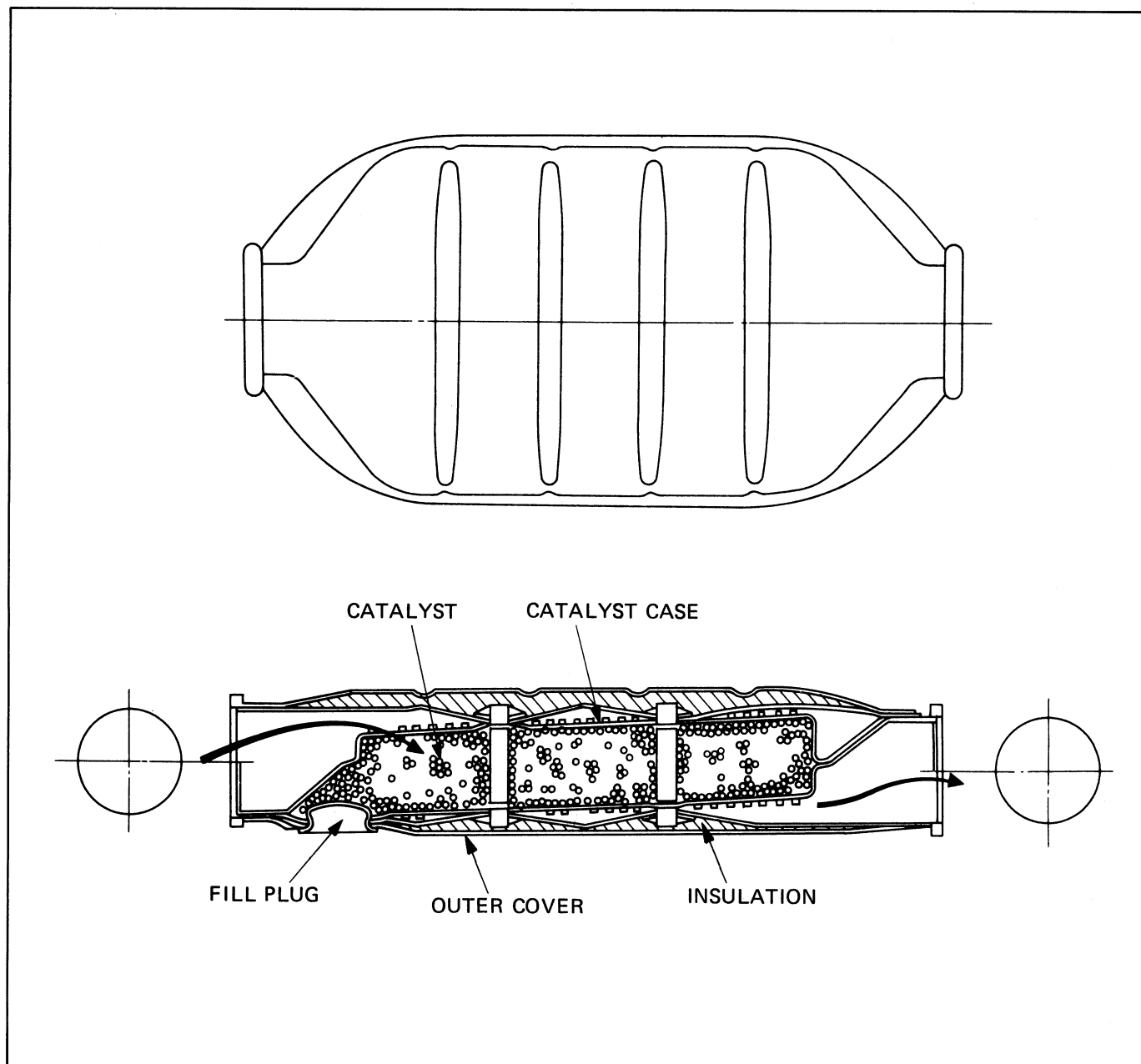
OXIDIZING CATALYTIC CONVERTER SYSTEM (FEDERAL)



This system provides a container of oxidizing catalyst. The catalyst can speed up and complete the burning of hydrocarbon and carbon monoxide emission. A 2.6 liters (160 cu.in.) underfloor oxidizing catalytic converter is used to control hydrocarbon and carbon monoxide emissions in this system.

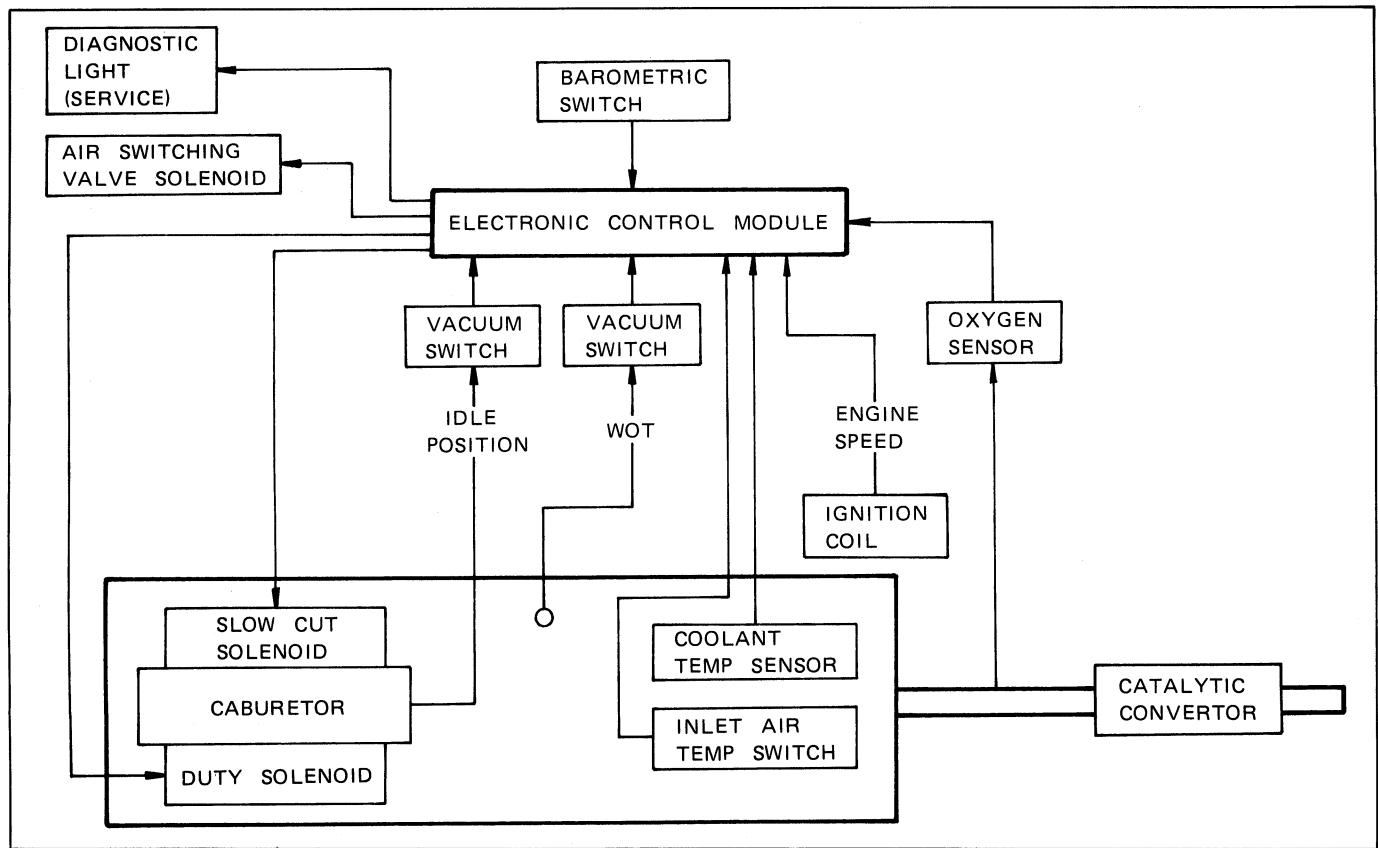
Catalytic emission control is accomplished by placing an oxidizing catalytic converter in the exhaust system in such a manner that all exhaust gas flow from the engine must pass through it and undergo a chemical reaction before passing into the atmosphere. The chemical reaction involved is the oxidation of hydrocarbon and carbon monoxide into water and carbon dioxide.

THREE-WAY CATALYTIC CONVERTER SYSTEM (CALIFORNIA)



The three-way catalytic converter reduces oxides of nitrogen while oxidizing hydrocarbons and carbon monoxide. To maintain high conversion efficiency, it is necessary to closely control the air fuel ratio precisely.

CLOSED LOOP EMISSION CONTROL (CALIFORNIA)

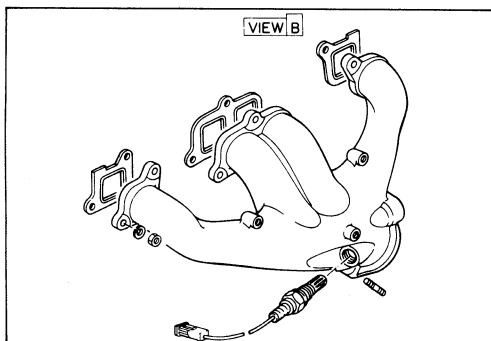


The Closed Loop Emission Control system is an electronically controlled exhaust emissions system. The major components are:

- Oxygen Sensor
- Coolant Sensor
- Electronic Control Module (ECM)
- Idle and WOT Switches
- Duty solenoid carburetor
- Fuel Cut Solenoid
- Catalytic Converter

The system features a "CHECK ENGINE" fault lamp on the instrument panel which will light in case of a system malfunction and will remain illuminated as long as the engine runs with the malfunction uncorrected. This same lamp, through an integral diagnostic system, will aid a technician in locating the cause of the light.

OXYGEN SENSOR



The oxygen sensor used in the closed loop control system consists of a closed end zirconia sensor placed in the engine exhaust gas stream. This sensor is mounted in the exhaust manifold. The sensor generates a voltage which varies with the oxygen content in the exhaust gas stream. As oxygen content rises (lean mixture) voltage falls, and as oxygen content falls, (rich mixture) voltage rises.

ELECTRONIC CONTROL MODULE (ECM) (CALIFORNIA ONLY)

The ECM generates a control signal to the vacuum control solenoid which controls carburetor A/F ratio through vacuum signals. This control signal is continuously cycling the solenoid between on and off (duty cycle) as a function of the input voltages from the sensors.

The control signal generated by the ECM is selected from four operational modes as follows:

1. Inhibit Mode: No signal to vacuum control solenoid.
2. Enrichment Mode: a pre-selected duty cycle is generated based on various parameters.
3. Open Loop Mode: a pre-selected duty cycle is generated based on various parameters.
4. Closed Loop Mode: A calculated duty cycle is generated based on oxygen sensor and other sensor outputs.

During closed loop operation, the ECM monitors the voltage output of the oxygen sensor. When the exhaust is lean, the oxygen sensor voltage is low and the ECM commands a richer mixture. When the exhaust is rich, the oxygen sensor voltage is higher and the ECM commands a leaner mixture.

The ECM also stores in memory the current duty cycle being used for either idle or off-idle condition. When the ECM sees a change from idle condition (as signaled by the vacuum switch) to off-idle condition, it immediately steps to the duty cycle last recorded for optimum operation. From then on, while at that engine operating condition, the system uses the basic controls as previously described.

The ECM senses the coasting condition by means of the signals from two (2) vacuum switches (Idle Position Switch and WOT Switch), cutting off the flow of the electric current to the duty solenoid in such an instance where the engine running speed is beyond the limit of the speed specified, marking thereby the fuel flow to the carburetor (#1) to be shut down. The flow of the electric current to the slow cut solenoid is cut off only at the time when the following two conditions exist simultaneously.

That is:

- 1) The vacuum signal to vacuum switches are below or above the specified vacuum. (The carburetor throttle valve is as idle position).
- 2) The engine speed exceeds the limit of the specified speed.

DUTY SOLENOID IN CARBURETOR (CALIFORNIA ONLY)

The duty solenoid in carburetor controls the air/fuel ratio, operated by the electronic control module.

COOLANT TEMPERATURE SENSOR (CALIFORNIA ONLY)

The temperature sensor is mounted in the engine coolant stream. It has a high resistance (around 100,000 ohms) when the coolant is cold and a low resistance (under 1,000 ohms) when the coolant is warm. The sensor sends information on engine temperature to the ECM to the ECM which is used for the following:

- To vary the air-fuel ratio as the engine coolant temperature varies with time during a cold start.
- To accomplish various switching functions at different temperatures on AIR Management System.

BAROMETRIC SWITCH (CALIFORNIA ONLY)

The barometric switch is connected to the ECM and is intended to make the System Malfunction Indicator Lamp inoperative in the case of "Rich Oxygen Sensor Error" alone at a proscribed altitude or higher.

There is no interaction between the barometric switch and the emission control system.

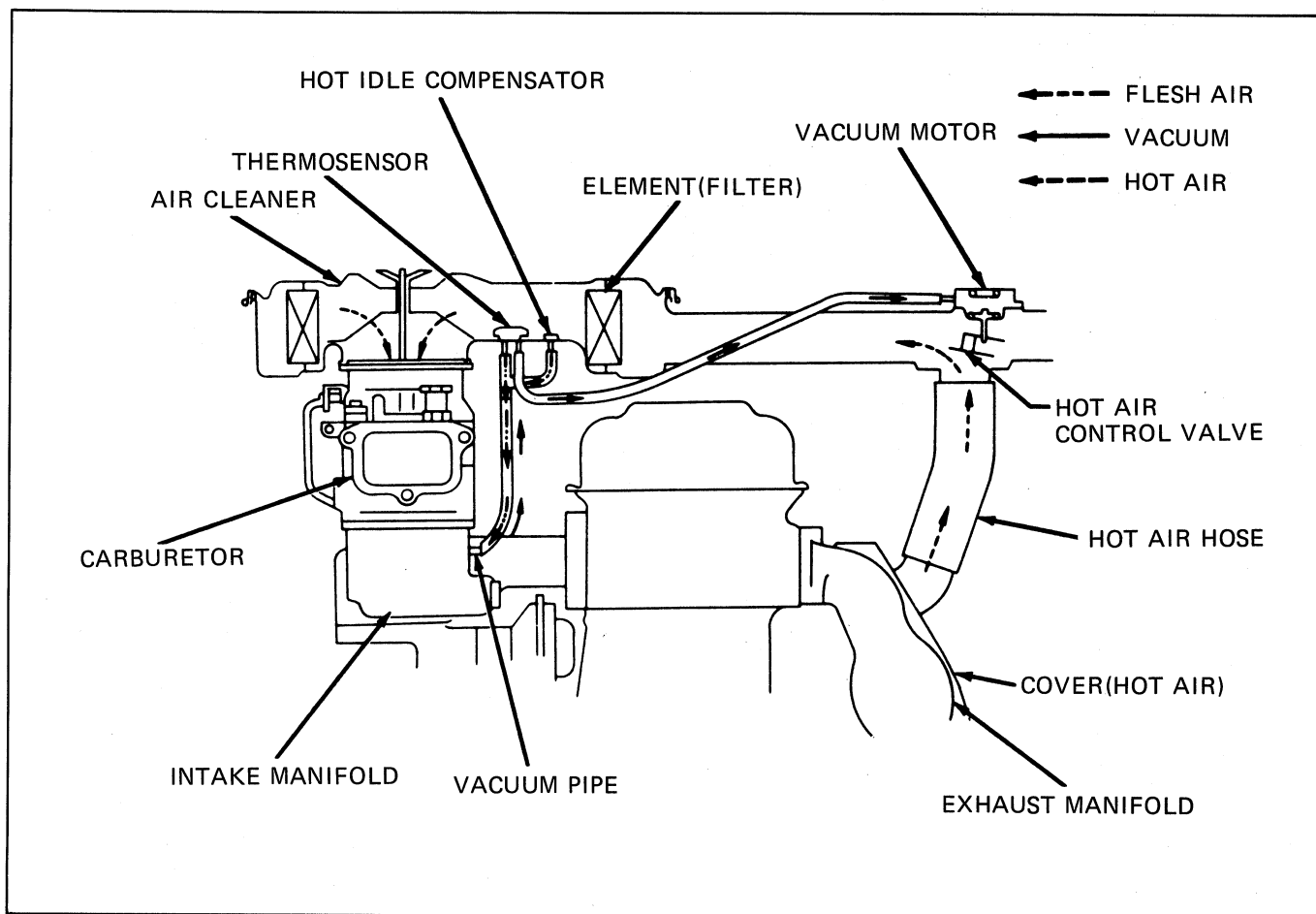
INLET AIR TEMPERATURE SWITCH (CALIFORNIA ONLY)

The inlet air temperature switch is a bimetal switch which senses air cleaner inlet temperatures and is connected to the ECM.

This switch is intended to make System Malfunction Indicator Lamp inoperative in the case of "Lean Oxygen Sensor Error" alone at prescribed air cleaner inlet temperature or below.

There is no interaction between the inlet air temperature switch and emission control system.

THERMOSTATICALLY CONTROLLED AIR CLEANER SYSTEM (TCA)



As the rate of the fuel atomization varies with the temperature of ambient air, which in turn varies with atmospheric temperature, the air-fuel ratio cannot be held constant for efficient fuel combustion. This then allows harmful content in the exhaust gases to increase when the temperature of ambient air is inadequate for efficient fuel atomization. The automatic temperature-controlled air cleaner is designed so that the temperature of ambient air is automatically controlled to hold the fuel-air ratio constant for efficient fuel combustion.

The Thermostatically Controlled Air Cleaner (TCA) Induction consists principally of the thermosensor, vacuum motor, hot air control valve, and hot idle compensator. These components are mounted to the air cleaner body and snorkel.

When the engine is OFF, no vacuum is present at the sensor unit or at the vacuum motor. The force of the vacuum motor spring closes off the "heated air" passage from the exhaust manifold heat stove (snorkel passage open). When the engine is started cold, the thermosensor is cool allowing maximum vacuum to the vacuum motor. Maximum vacuum at the vacuum motor completely opens the hot air control valve, closing off the ambient passage through the snorkel and opening the air passage the air passage from the manifold heat stove.

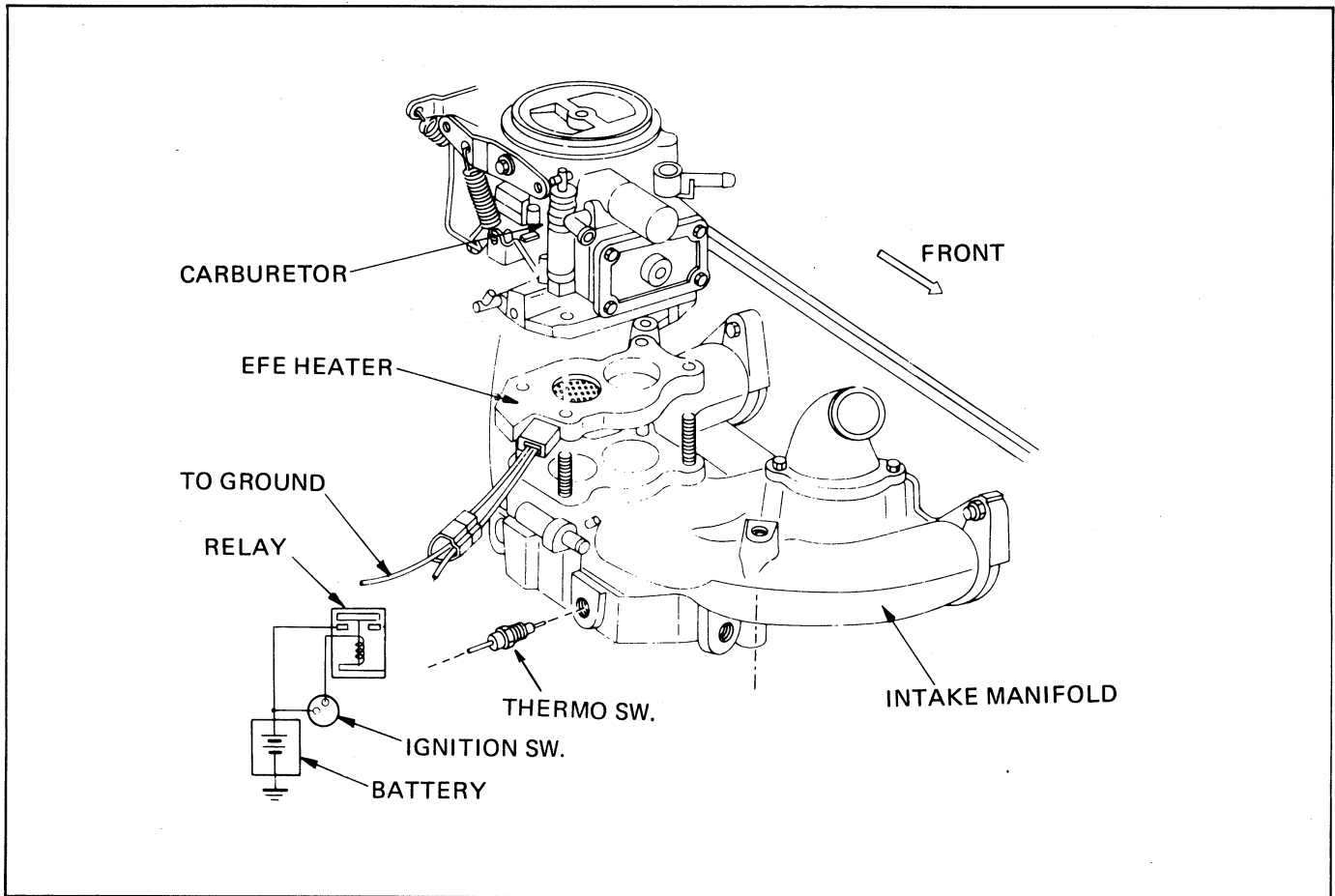
Should the engine be heavily accelerated while in this mode, the vacuum level in the system will drop to a low enough level so that the diaphragm spring will overcome the vacuum and open the snorkel passage.

As the engine heats up and the air past the thermosensor reaches between 38° to 44°C (100° to 111°F), the thermosensor comes into operation and begins to bleed off the supply of vacuum from the intake manifold. At approximately 44°C (111°F), the thermosensor completely bleeds off all vacuum to the vacuum motor so that the diaphragm spring closes the hot air control valve to the heat stove passage and opens the ambient air passage through the snorkel.

Extended idling, climbing a slope or continuous high-speed driving is immediately followed by a considerable increase in engine and engine compartment temperature.

With this heat build-up, excessive fuel vapors enter the intake manifold causing an over rich mixture that results in rough idle and increased carbon monoxide emission. To prevent this, the air cleaner is equipped with a hot idle compensator. As the engine heats up and air past the hot idle compensator reaches a specified temperature, the compensator opens to feed ambient air into the intake manifold to lean out the temporarily rich mixture.

EARLY FUEL EVAPORATION SYSTEM (EFE)

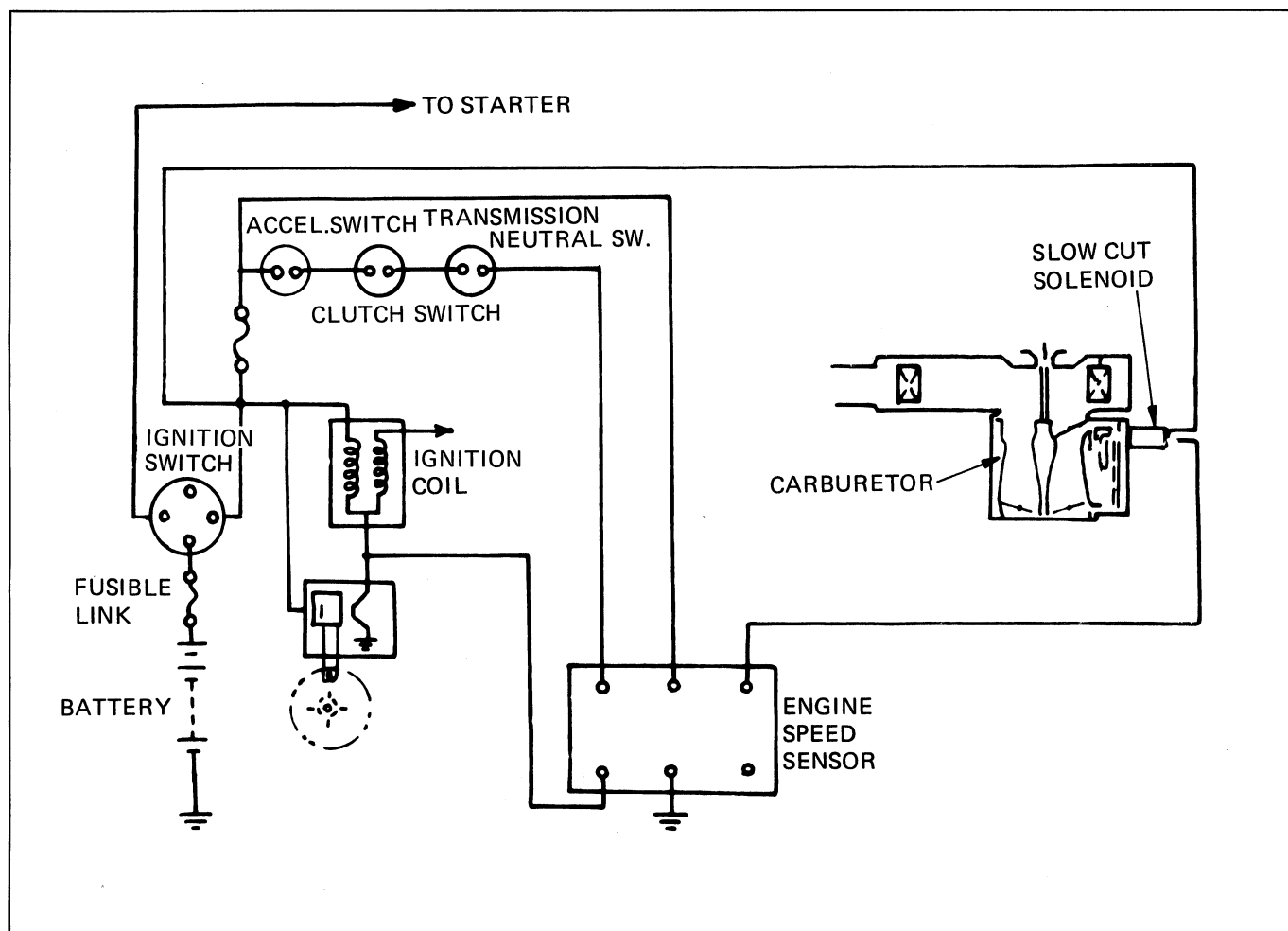


The electric EFE system utilizes a ceramic heater grid located underneath the primary bore of the carburetor as part of the carburetor insulator gasket. It heats the incoming air-fuel charge for improved vaporization and driveability during cold drive-away.

When the ignition switch is turned on, voltage is applied through a relay to an EFE temperature switch. If engine coolant temperature is below a calibrated value, a circuit is completed to the heater and current begins to flow. The heater increases in temperature and then self-regulates at a calibrated temperature, except at high engine speeds when the air-fuel flow will reduce the temperature below the regulated value. When coolant temperature reaches the calibrated value, the snap action temperature switch cuts off current to the heater.

COASTING FUEL CUT DEVICE (Federal only)

The coasting fuel cutoff system consists principally of a slow cut solenoid valve incorporated in the carburetor, an engine speed sensor, a transmission switch, an accelerator switch and a clutch switch. This system is an auxiliary fuel system operated by the slow cut solenoid. When de-energized, the solenoid pulls a plunger out to close the fuel slow passage.



MANUAL TRANSMISSION MODEL

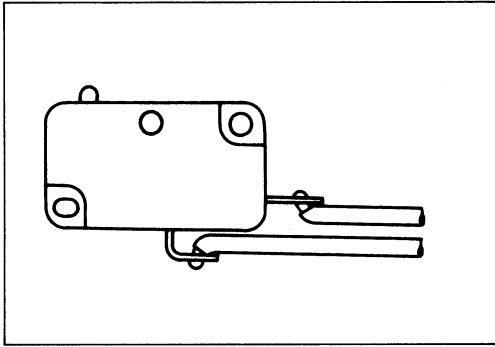
Accelerator switch, clutch switch, transmission neutral switch and engine speed sensor.

ENGINE SPEED SENSOR

The engine speed sensor detects engine revolutions, sensing ignition pulse from an ignition coil.

When the engine speed exceeds approximately 2000 rpm, the engine speed sensor turns "OFF" and the coasting fuel cut solenoid becomes de-energized.

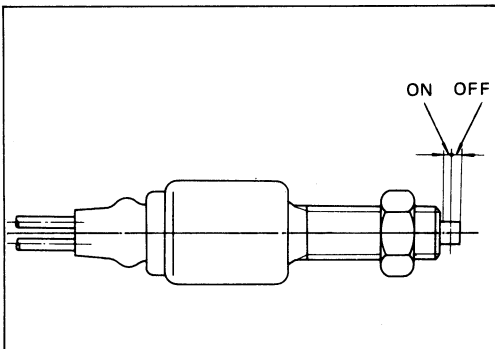
ACCELERATOR SWITCH



Accelerator switch

The accelerator switch is connected to the accelerator linkage and is turned ON, when the accelerator pedal is not depressed. The accelerator switch is turned OFF and opens the circuit when the accelerator pedal is depressed.

CLUTCH SWITCH



Clutch switch

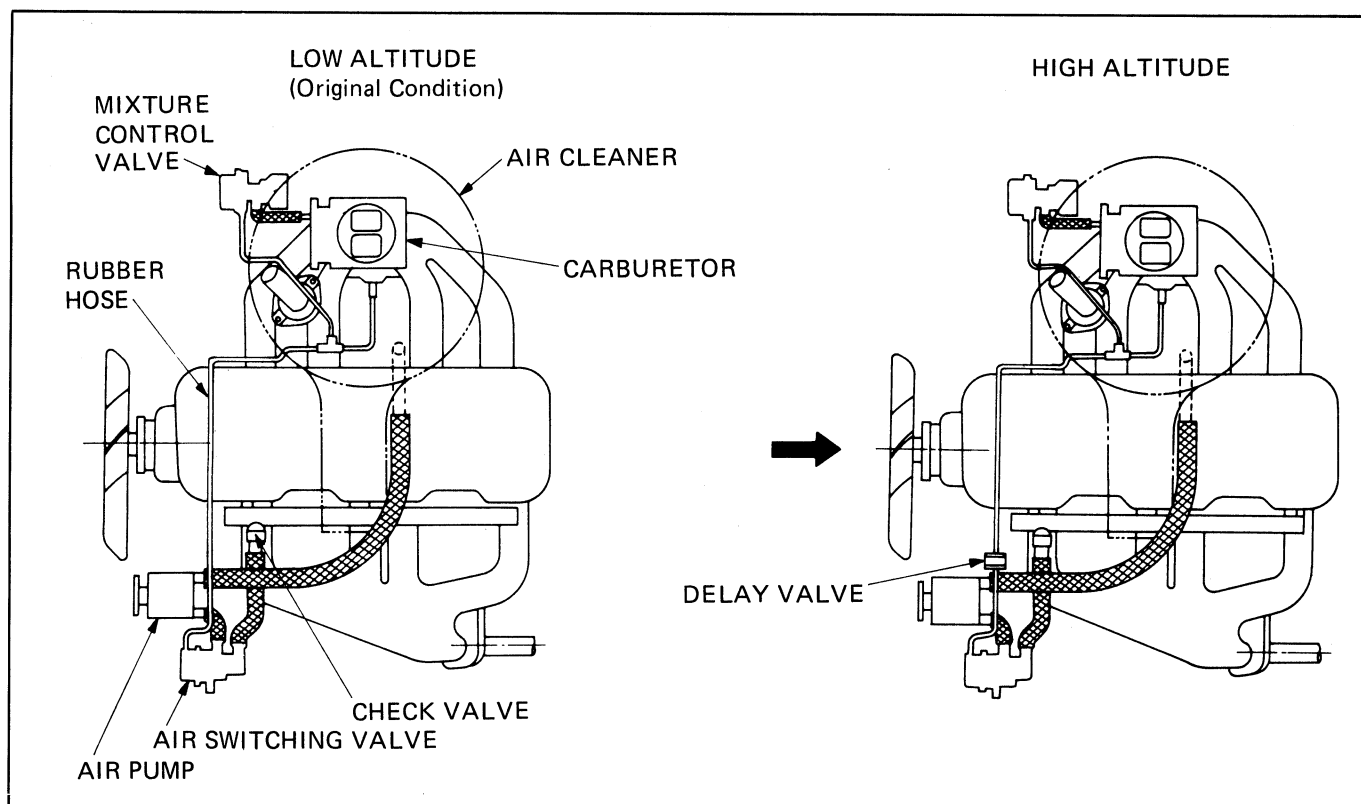
The clutch switch is installed near the clutch pedal and turns OFF when the clutch pedal is depressed. When the clutch switch is turned OFF, the coasting richer circuit is de-energized.

TRANSMISSION NEUTRAL SWITCH

The transmission neutral switch is installed on the transmission shift quadrant. It turns ON when shifted into any gear position and turns OFF when shifted into the neutral position. When the transmission neutral switch turns ON, the coasting richer circuit is energized. Conversely, the coasting richer circuit is de-energized when it is turned OFF.

HIGH ALTITUDE EMISSION CONTROL SYSTEM

If the place of a vehicle's principal use is changed from low altitude to high altitude or vice versa, altitude adjustment will be necessary for improvement of engine performance and exhaust emission control performance.



ALTITUDE MODIFICATION AND/OR ADJUSTMENT PROCEDURE

New vehicle

1. Low altitude to high altitude procedure
 - 1) Stop the engine and apply the parking brake.
 - 2) Disconnect the rubber hose from air switching valve located on the front left side of the engine.
 - 3) Connect the delay valve to the above disconnected hose and valve. Ensure that the rubber hose on the mark "A" side of the delay valve is connected to the 3-way, and the rubber hose on the mark "B" to the air switching valve.
 - 4) Adjust the engine speed to the specification.
 - 5) Check the ignition timing.
 - 6) Attach the label.

High altitude kit

Device & Parts	● Delay valve with hose ● Label
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2. High altitude to low altitude procedure
(Original destination is high altitude specification)
 - 1) Disconnect the rubber hose from the air switching valve located on the front left side of the engine.
 - 2) Remove the delay valve.
 - 3) Connect the rubber hose to the air switching valve.
 - 4) Adjust the engine speed to the specification.
 - 5) Check the ignition timing.
 - 6) Remove the label.

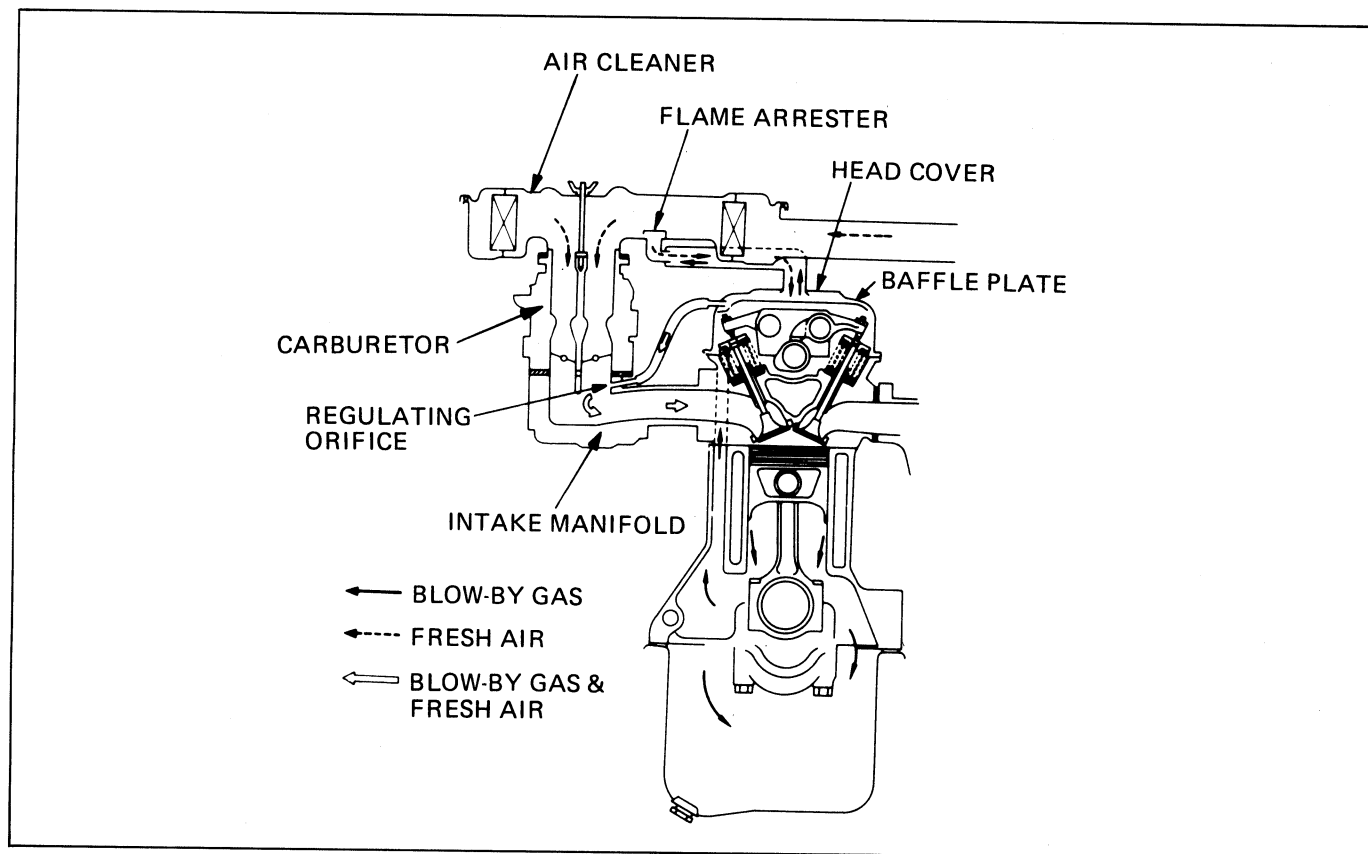
In use vehicle

1. Low altitude to high altitude procedure
 - 1) Engine ignition timing can be advanced up to 4° from specification. Timing should not be advanced if spark knock occurs at high altitude.
 - 2) Engine speeds should be adjusted to specification. (See Vehicle Emission Control Information).
 - 3) Attach the label.
2. High altitude to low altitude procedure

This engine must be returned to the original specifications and the label removed.

CRANKCASE EMISSION CONTROL SYSTEM

POSITIVE CRANKCASE VENTILATION



The Positive Crankcase Ventilation (PCV) system is designed to force blow-by gases generated in the engine crankcase back into the intake manifold, then deliver them, together with the air-fuel mixture, to the combustion chamber.

This is a closed system, consisting of a baffle plate in the rocker arm cover for separating oil particles from blow-by gases; an orifice in the intake manifold for controlling suction of blow-by gases; a hose connecting parts, and a hose for leading fresh air from the air cleaner into the control system.

Under normal operating conditions, blow-by gases passing between pistons and cylinder walls and fuel vapor emitted from the tank are mixed within the engine with ambient air supplied from the air cleaner.

The blow-by gases are then drawn, through the regulating orifice into the intake manifold for reburning. When the engine is running with the throttle wide open, the vacuum within the intake manifold is not sufficiently high to cover the entire amount of blow-by gases, allowing a part of them to be drawn into the air cleaner via the rear end of the rocker arm cover.

REGULATING ORIFICE

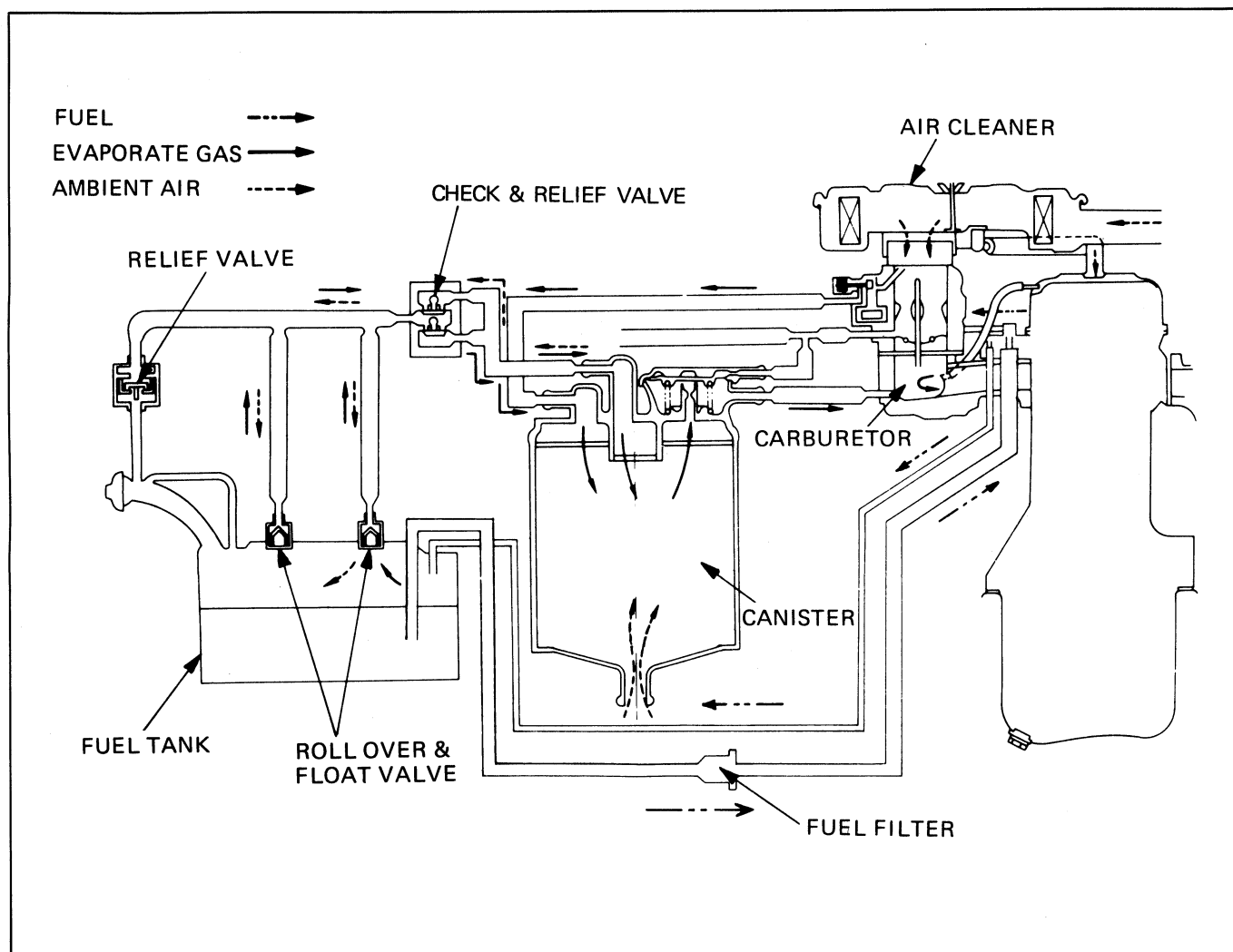
The amount of blow-by gases is small when the engine is running with a light load, but increases in proportion to increase in the engine load.

When the engine is running a light load and the amount of blow-by gases is small, a high vacuum is developed in the intake manifold. Conversely, when the engine is heavily loaded, generating a considerable amount of blow-by gases, the vacuum in the intake manifold lowers, with a resulting reduction in suction force.

It is, therefore, necessary to install a flow control orifice that calibrates the flow of blow-by gases in response to variation in vacuum developed in the intake manifold. The regulating orifice is adapted for this purpose and is installed with the intake manifold.

EVAPORATIVE EMISSION CONTROL SYSTEM

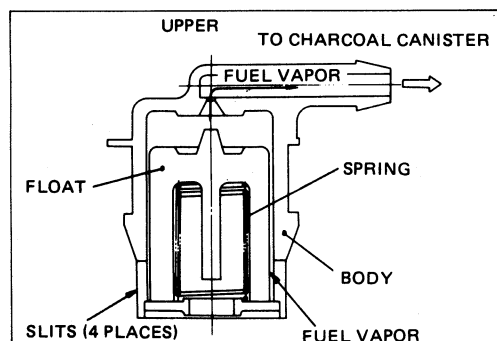
EVAPORATION CONTROL SYSTEM



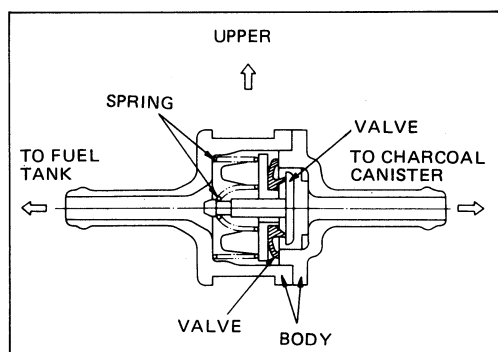
The evaporation control system is designed to lead the fuel vapor emitted from the fuel tank and the carburetor into the carbon canister. This system consists of the roll over & float valves, relief valve, check and relief valve, charcoal canister, vent switching valve and tubes connecting these parts.

The fuel vapor, stored in the canister and mixed with ambient air, is led directly to the intake manifold for combustion when the engine is running.

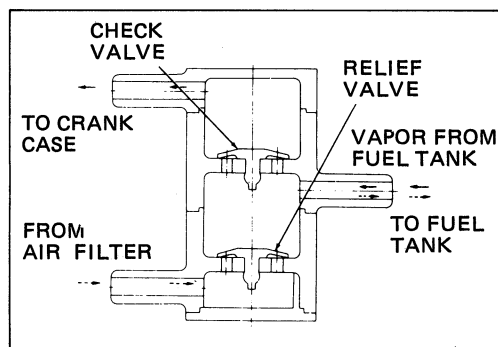
ROLL OVER & FLOAT VALVE AND RELIEF VALVE



The roll over & float valves are designed to prevent fuel leaks when the vehicle has turned over, and the relief valve is intended to relieve the tank internal pressure to avoid tank damage when the pressure has reached a certain level as the result of the roll over & float valves blocking the fuel escape. None of these components are relevant to evaporative emission control system.



CHECK AND RELIEF VALVE



When the engine is not running.

The fuel vapor taken up into the roll over fuel trap is fed into the check and relief valve. When the pressure of the fuel vapor reaches 25.4 to 35.5 mmHg. (1.0 — 1.4 in.Hg.), the check valve opens, allowing the vapor into the canister. While the check valve is held open, the valve at the air cleaner side remains closed, preventing the flow of vapor into the air cleaner.

When the engine is running.

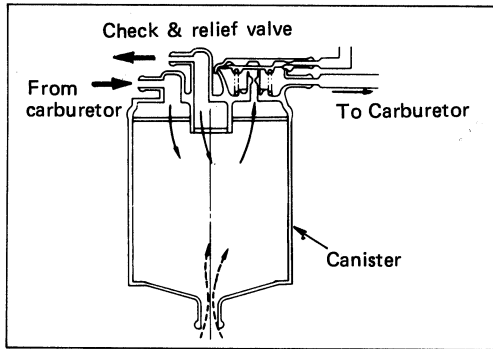
When negative pressure is developed in the fuel tank and the difference of pressure between the relief side and fuel tank becomes 5.0 to 15.2 mmHg. (0.2 — 0.6 in.Hg), the relief valve opens, allowing ambient air from the air cleaner into the fuel tank. This ambient air replaces the vapor within the fuel tank, bringing the fuel tank back into an atmospheric pressure condition.

VENT SWITCHING VALVE

The vent switching valve is an electrically operated solenoid valve built into the carburetor.

This functions as follows.

1. When the engine is not running:
The vent switching valve is opened to introduce fuel vapor into the canister.
2. When the engine is running.
The vent switching valve is closed to prevent ambient air from flowing into the carburetor thru the canister.

CANISTER

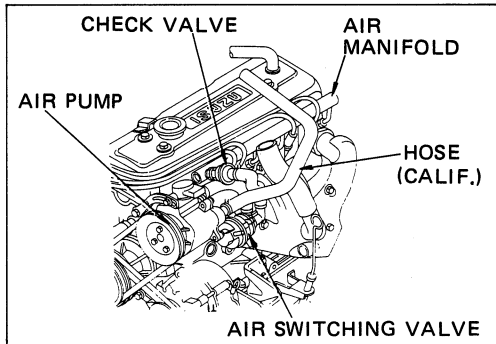
The canister contains activated carbon to store up fuel vapor coming from the carburetor and fuel tank and also incorporates a purge control valve to purge fuel vapor from the carbon in canister for delivery to intake manifold. The diaphragm with purge control valve is activated by a distributor vacuum advance signal. When the engine is off, the force of the diaphragm spring closes the purge vapor passage. When the engine is running, the distributor vacuum advance signal is transmitted to the diaphragm.

When the signal vacuum goes over the specified values, the purge control valve opens the passage by movement of the diaphragm and fuel vapor in the canister is inducted into the engine intake manifold. This fuel vapor purge rate is controlled by the engine intake manifold vacuum pressure and the orifice in the purge control valve.

ON-VEHICLE SERVICE

(REMOVAL AND INSTALLATION, INSPECTION AND ADJUSTMENTS)

AIR INJECTION REACTOR SYSTEM



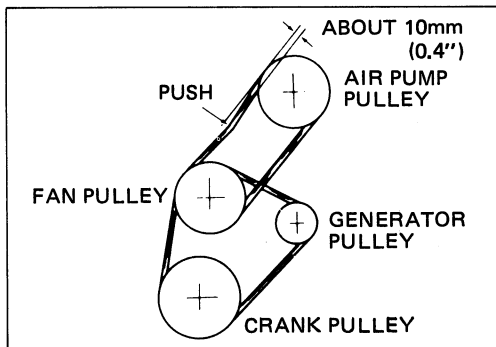
Air injection pump

Inspection and replacement

Check the air pump for any abnormal noise and replace if found to be defective.

Note: The air pump is non-serviceable, it must be replaced as an assembly if found defective.

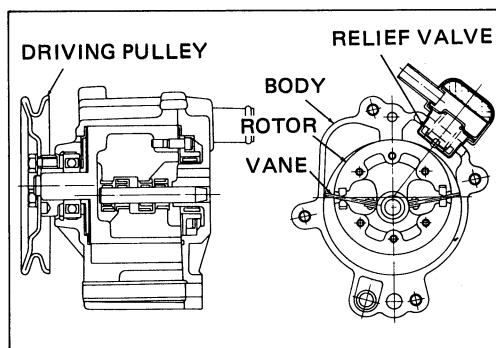
1. Remove the air pump drive belt from the air pump pulley.
2. Disconnect the hoses from air switching valve.
3. Remove the attaching bolts from the engine mount and jack up the mount.
4. Remove the air pump mounting bolts and the air pump and air switching valve.
5. Remove the air switching valve from the air pump.
6. Reverse the procedure to install.



Air pump drive belt

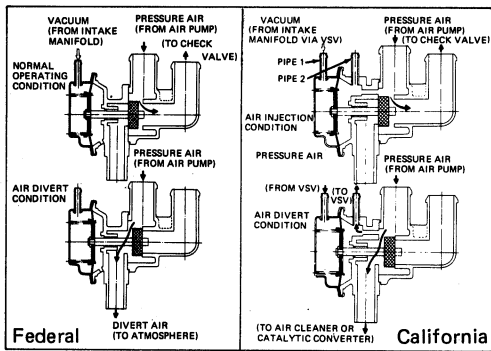
Adjust the tension of the drive belt by means of the adjusting plate. When properly adjusted, the drive belt should have a lateral deflection of about 10 mm (0.4 in.), when finger pressure is applied to the belt between the air pump and the fan pulley.

Note: When adjusting drive belt tension, do not pivot the air pump by prying with a lever, or distortion of the pump body will result.



Air pump

Check the air pump for any abnormal noise and replace if found to be defective.



Air switching valve

Inspection and replacement

If the air switching valve is normal, the secondary air continues to blow out from the valve a few seconds when the accelerator pedal is depressed all the way to floor and released quickly. If the secondary air continues to blow out for more than 5 seconds, replace the air switching valve.

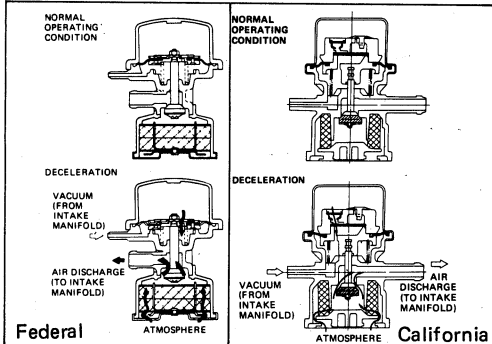
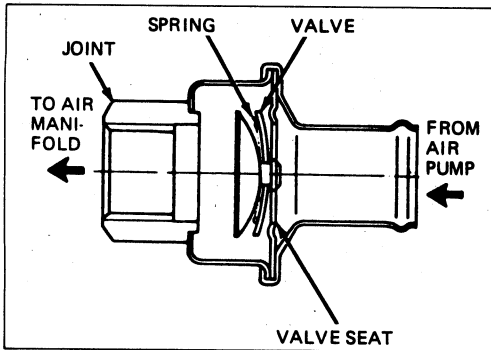
1. Remove the hoses from the air switching valve.
2. Remove the mounting hardware and the valve.
3. Reverse the procedure to install.

Check valve

Inspection and replacement

Remove the check valve from the air manifold. Test for leakage by blowing air into the valve from the air pump side and from the air manifold side. If the check valve is normal, air passes only from the air pump side. If air passes from the air manifold side, it indicates the need for replacing the check valve. A small amount of air leakage may be overlooked.

1. Release the clamp and disconnect the air hose from the check valve.
2. Unscrew the check valve from the air injection pipe.
3. Reverse the procedure to install.

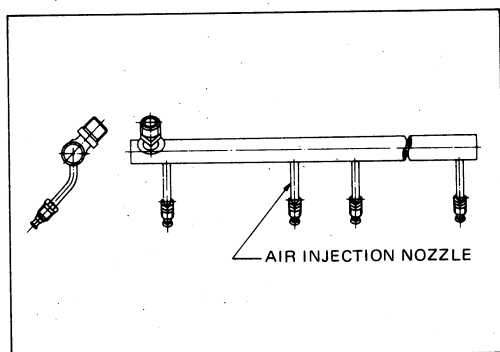


Mixture control valve

Inspection and replacement

Disconnect the rubber hose connecting the mixture control valve with the intake manifold, and plug the intake manifold side. If the mixture control valve is normal, the secondary air continues to blow out from the mixture control valve for a few seconds when the accelerator pedal is depressed all the way to floor and released quickly. If the secondary air continues to blow out for more than 5 seconds, replace the mixture control valve.

For replacement, remove the valve from the clamp bracket and remove the hose.

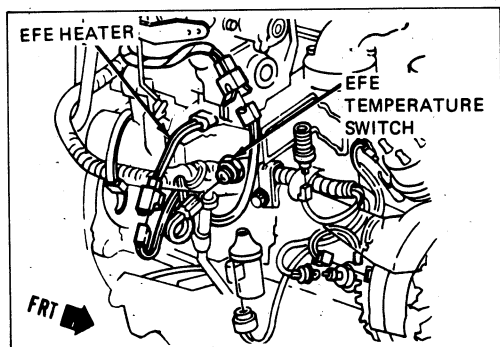


Air hoses and injector pipes

Inspection and replacement

Check around the air manifold for air leakage with the engine running at 2,000 rpm. If air is leaking from the nozzle sleeve nuts, retighten them.

Check and replace the hoses if found to be fatigued or cracked. Also check the hose joints and clips. Be sure that the hoses are not in contact with adjacent parts.



Vacuum switching valve

Replacement

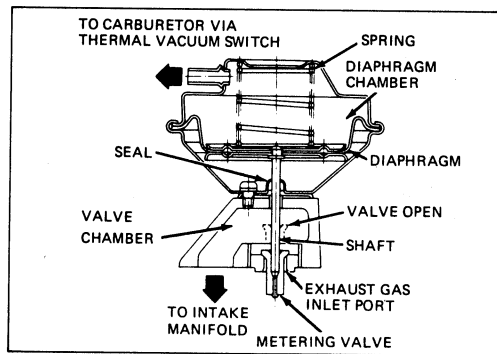
1. Disconnect the electrical connector.
2. Remove the hoses from the valve.
3. Remove the vacuum switching valve.
4. Reverse the procedure to install valve.

Proper operation of the vacuum switching valve can be checked by carefully listening for noise that is accompanied by electrically operating the plunger. The plunger can be operated electrically by connecting the connector terminals to the battery with suitable cables.

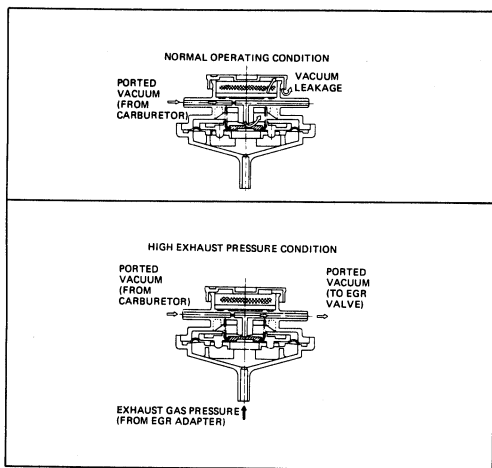
Hose

Check and replace the hoses if found to be fatigued or cracked. Also check the hose joints and clips. Be sure that the hoses are not in contact with adjacent parts.

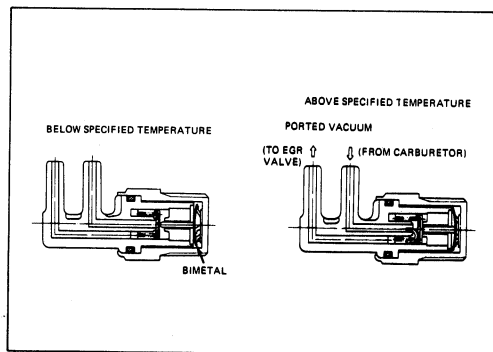
EXHAUST GAS RECIRCULATION SYSTEM

**EGR Valve**

Check vacuum diaphragm function by applying an outside vacuum source to the vacuum supply tube at the top of the vacuum diaphragm. The diaphragm should not "leak down" and should move to the fully up position at about 120 mmHg (4.7 in.Hg) vacuum for Federal M/T (short and long) and 100 mmHg (3.9 in.Hg) for others.

**Back pressure transducer replacement**

Apply pressure above 50 mm Aq (2 in. Aq) to the port connected to the B.P. signal pipe and check for leakage. If leakage is noted, replace it as an assembly.

**Thermal vacuum valve**

Put the thermo sensing portion into hot water 46° to 54°C (115° to 129°F) for M/T or 45° to 55°C (113° to 131°F) for A/T and check the valve opening by blowing air. If air does not pass, replace the thermal vacuum valve.

CLOSED LOOP EMISSION CONTROL SYSTEM

When troubleshooting the system, always check the electrical and vacuum connectors which may be the source of a problem before testing or replacing a component.

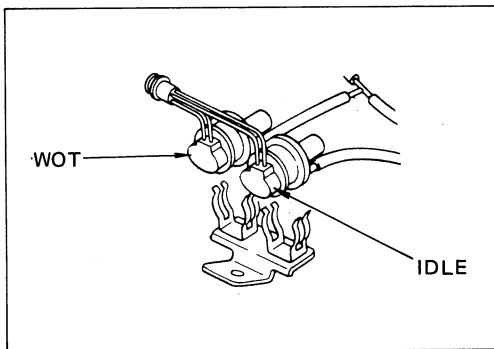
Electronic control module (ECM)

The ECM is located on the right side of the instrument panel. Do not replace ECM unless diagnosis has determined a fault in the ECM.

Temperature sensor

Replacement

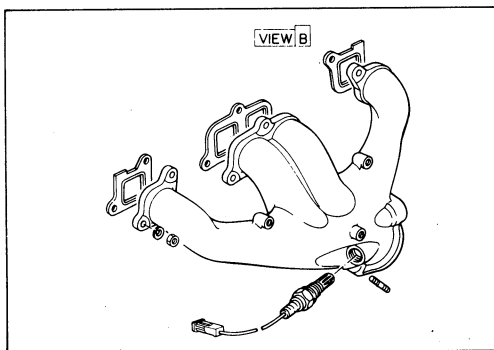
1. Disconnect electrical connection at temperature sensor.
2. Remove temperature sensor.
3. Install sensor and tighten to 0.7 kg-m (5.1 ft.lbs.)
4. Connect electrical connector.



Idle and WOT vacuum switch

Replacement

1. Disconnect electrical connector.
2. Disconnect vacuum hoses from sensors.
3. Remove idle and WOT vacuum switch.
4. Reverse procedure for installation.



Oxygen sensor

Oxygen sensor uses a permanently attached pig-tail and connector. This pig-tail should not be removed from the oxygen sensor. Damage or removal of pig-tail or connector could affect proper operation of the oxygen sensor.

Care must be taken when handling an oxygen sensor in order to preserve the efficiency. The in-line electrical connector and lowered end must be kept free of grease or other contaminants. Do not use cleaning solvents of any type.



Removal

Oxygen sensor may be difficult to remove when engine temperature is below 48°C (120°F). Excessive force may damage threads in exhaust manifold or exhaust pipe.

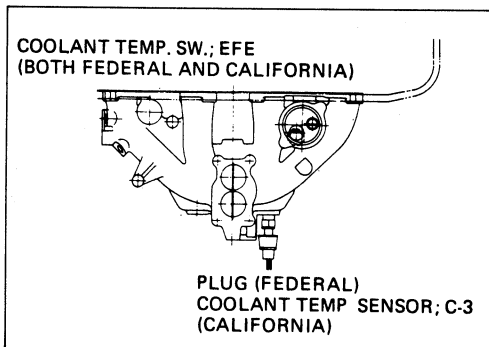
1. Disconnect electrical connector and any attaching hardware.
2. Remove oxygen sensor.



Installation

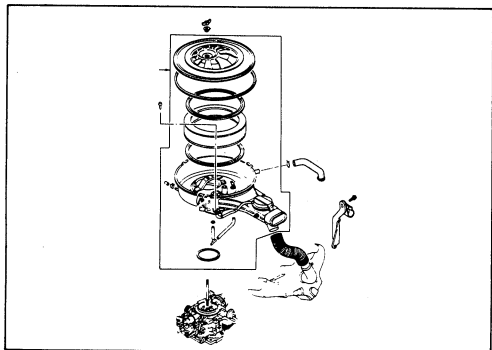
1. A new oxygen sensor is pre-coated with anti-seize compound.
2. Install sensor and torque to 4.1 kg-m (30 ft.lbs.).
3. Connect electrical connector and attaching hardware if used.

THERMOSTATICALLY CONTROLLED AIR CLEANER SYSTEM



Inspection

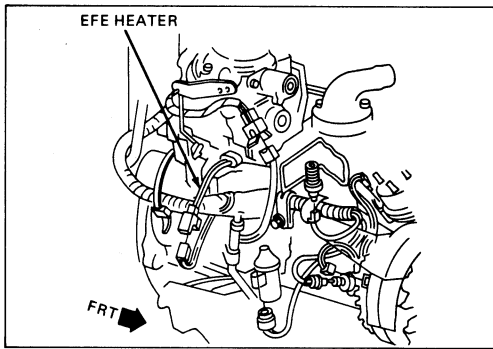
Check screws retaining vacuum motor for looseness, and rubber hoses between vacuum motor and thermosensor for loose connections. Check idle compensator and thermosensor fasteners for looseness. Check rubber hose between thermosensor and intake manifold for loose connections. Check other hoses for loose connections.



Air cleaner element replacement

1. Remove wing nut and air cleaner cover.
2. Remove element.
3. Install new element in air cleaner with either end up.
4. Install air cleaner cover and wing nut.

EARLY FUEL EVAPORATION SYSTEM

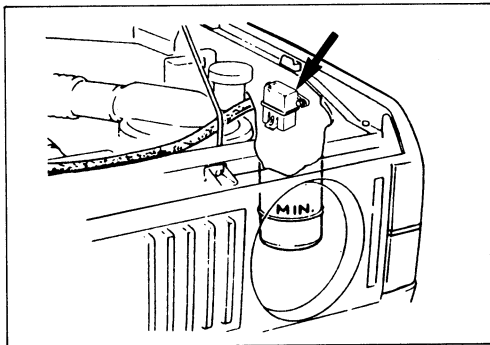


EFE Heater replacement

1. Remove air cleaner.
2. Disconnect all electrical, vacuum, and fuel connections from carburetor.
3. Disconnect EFE heater electrical connector.
4. Remove carburetor.
5. Replace EFE heater insulator assembly.
6. Reinstall carburetor.
7. Reconnect EFE heater electrical connection.
8. Reconnect electrical, vacuum and fuel connections to carburetor.
9. Replace air cleaner.
10. Start engine and check for vacuum leaks.

EFE Temperature switch replacement

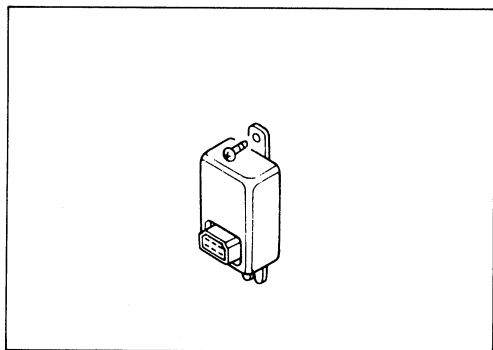
1. Drain coolant below level of engine coolant outlet housing.
2. Disconnect electrical connector.
3. Remove switch.
4. Apply a soft setting sealant uniformly on replacement switch threads. No sealant should be applied to sensor of switch.
5. Install switch and tighten to 14 N-m (10 ft.lbs.)
6. Connect electrical connector.
7. Add coolant as required.



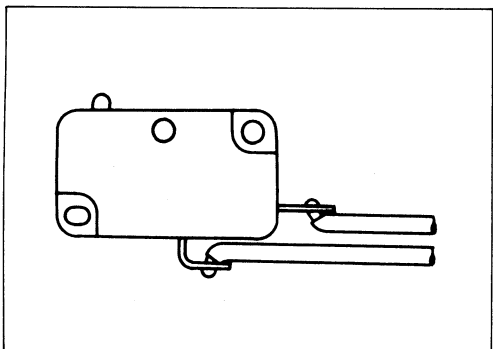
EFE Relay replacement

1. Disconnect battery ground.
2. Disconnect electrical connector at relay.
3. Remove bolts holding relay and remove relay.
4. Reverse procedure to install.

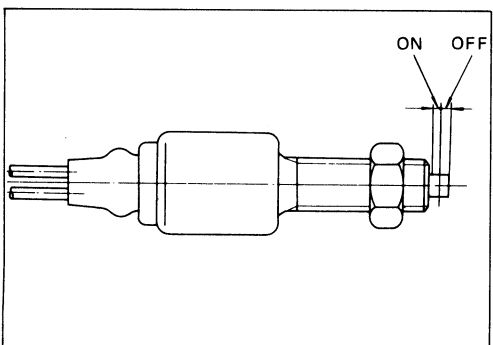
COASTING FUEL CUT DEVICE SYSTEM

**Engine speed sensor**

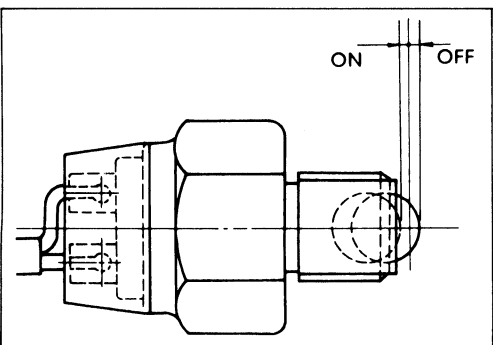
Connect "BY" and "LgW" color-coded wiring terminals at the wiring connector with suitable cables. Start the engine and check for the voltage between "Lg" and "BY" color coded wiring terminals. The engine speed sensor is normal if the voltage is zero when the engine runs over 2100 to 2300 rpm.

**Accelerator switch**

Check function of accelerator switch by operating accelerator pedal with switch wiring disconnected, and a tester connected in place. Accelerator switch is normal if it turns ON when the pedal is released and turns OFF when the pedal is depressed. If the switch does not work in response to the movement of the pedal, it is malfunctioning and should be replaced. Replacement of the switch requires no adjustment.

**Clutch switch**

Check function of clutch switch by operating clutch pedal with switch wiring disconnected, and a tester connected in place. Clutch switch is normal, if it turns ON when the pedal is released and turns OFF when the pedal is depressed. If switch does not work in response to the movement of the pedal, it is malfunctioning and should be replaced.

**Transmission neutral switch**

Check operation of transmission neutral switch by moving the gearshift lever with switch wiring disconnected and a tester connected in place. The switch is normal if it turns ON when shifted into any gear positions except Neutral position. If the switch does not turn ON through the check, it is malfunctioning and should be replaced.

POSITIVE CRANKCASE VENTILATION SYSTEM



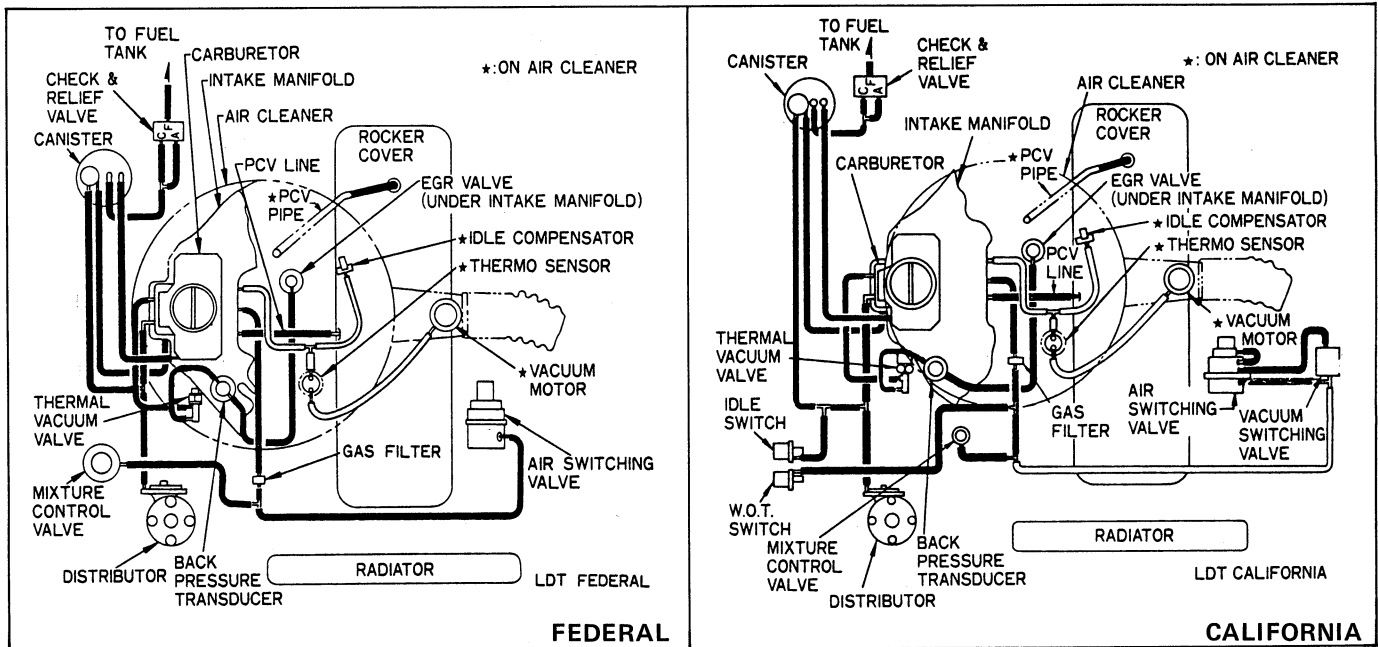
Regulating orifice and hose inspection



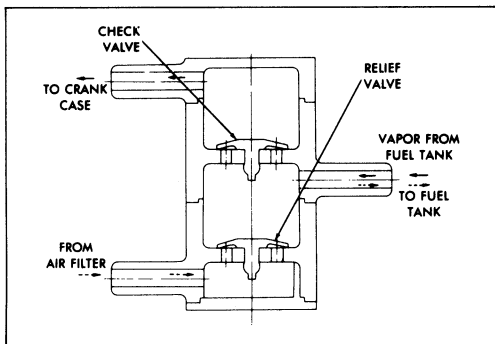
Clean hoses internally and calibrating orifice in detergent oil and blow away foreign matter with compressed air. Check hoses for cracks, fatigue and swelling, replace if necessary.

Clean internal part of hoses and regulating orifice in detergent oil and blow away foreign matter with compressed air. Check hoses for cracks, fatigue and swelling; replace if defective.

VACUUM HOSE ROUTING



EVAPORATIVE EMISSION CONTROL SYSTEM



Check and relief valve

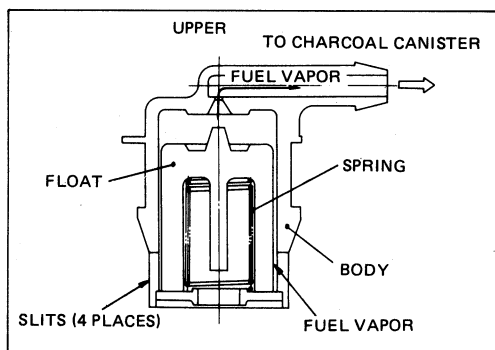
Remove check valve and inspect for leakage by blowing air into the ports in the check valve. Replace if found to be malfunctioning.

1. When air is applied from the fuel tank side, the check valve is normal if air passes into the check side (canister side), but not leaking into the relief side (air filter).
2. When air is applied from the check side, the valve is normal if passage of air is restricted.
3. When air is applied from the relief side (air filter), the valve is normal if air passes into the fuel tank side but does not leak into the check side (canister side).



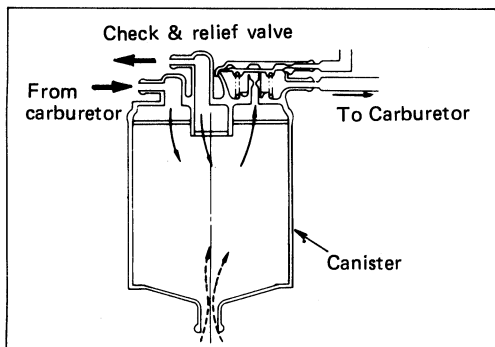
Rubber hoses

Check rubber hoses for cracks and fatigue, replace a necessary.



Roll over & float valve

Check roll over & float valve for fuel leaks, distortion, dents and orifice clogging; replace as necessary.



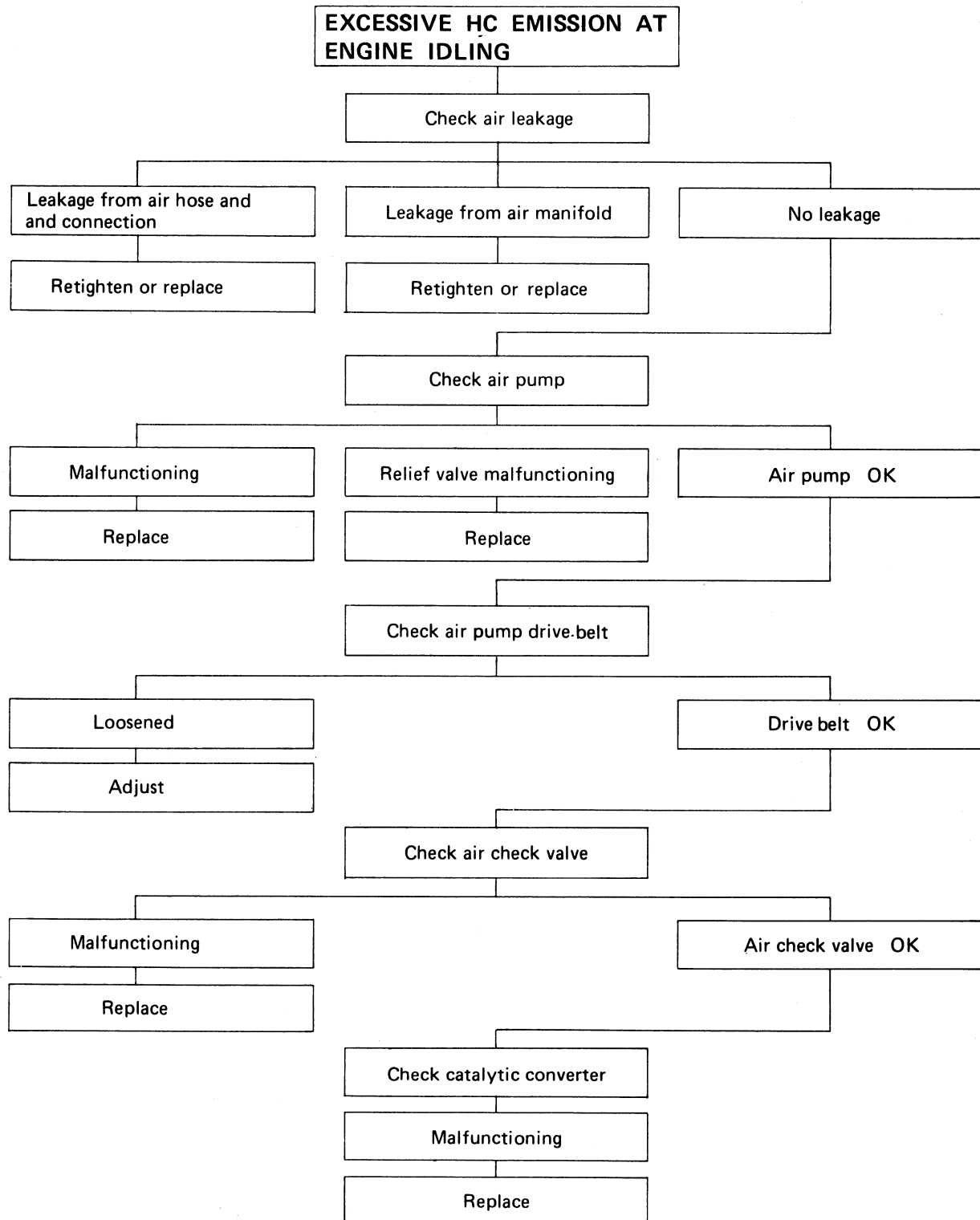
Canister

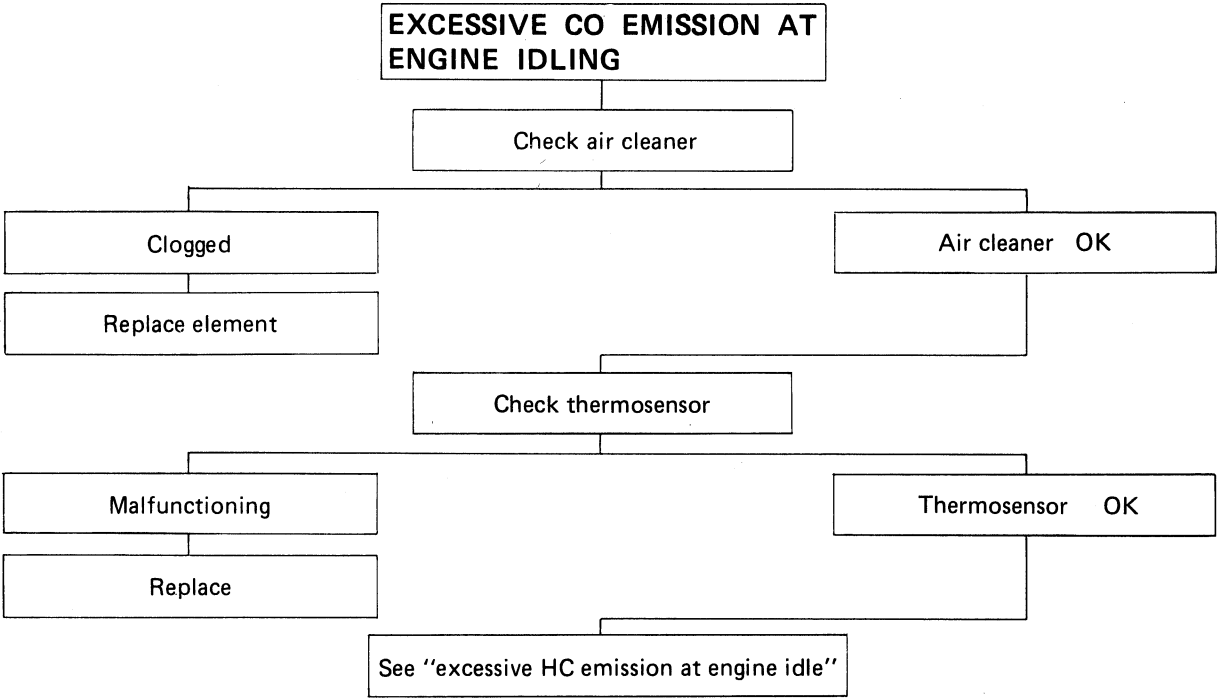
Remove the canister and inspect the functions of the purge control valve by the method shown below. Replace if found to be defective.

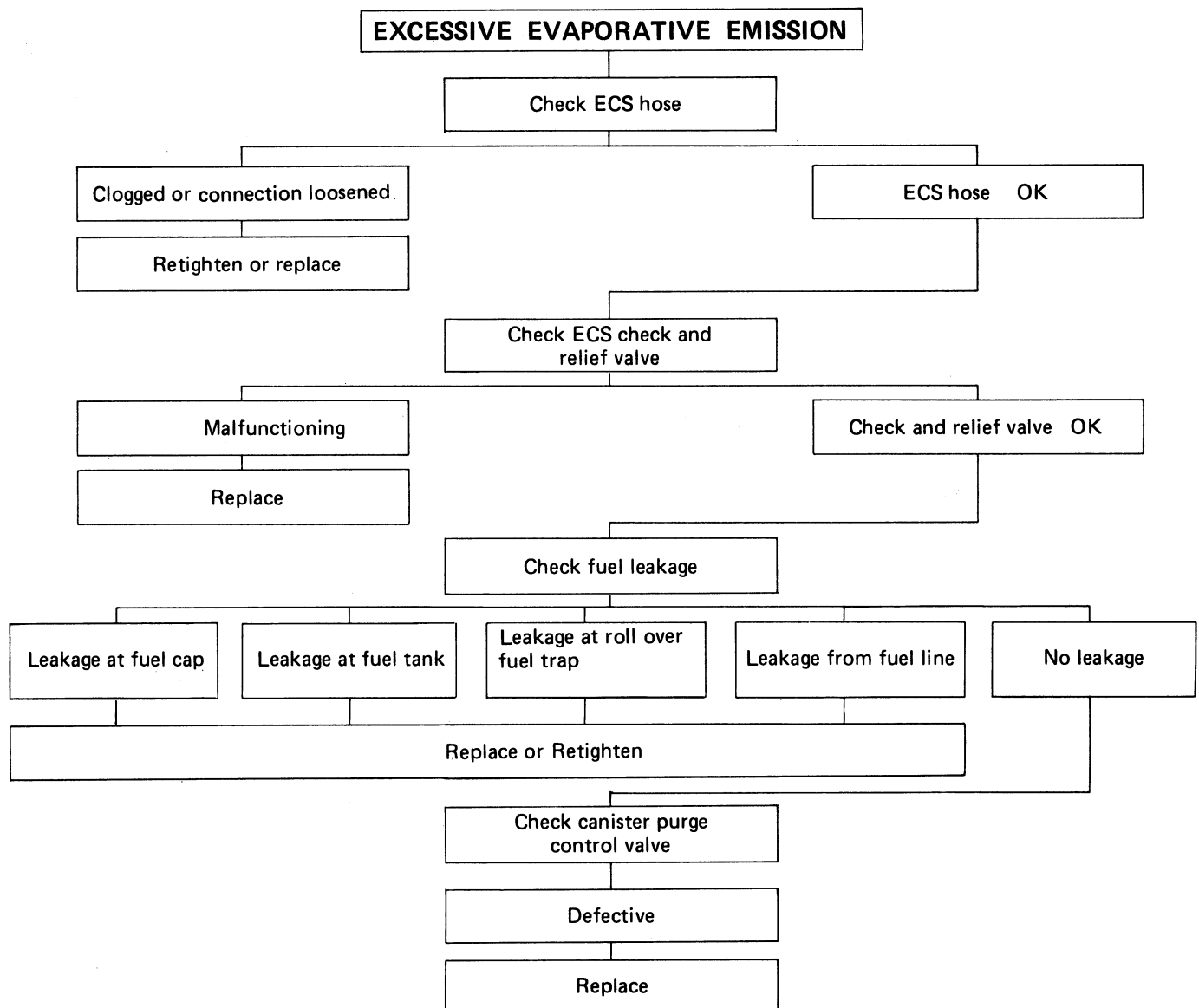
1. When 0.53 kg/cm^2 (7.5 lbs./in²) positive pressure is applied to the part marked "V.C.," there should not be an air leak from the diaphragm.
2. Apply 380 mm Hg (14.96 in.Hg) negative pressure to the port marked "PURGE" and maintain negative pressure. Negative pressure is gradually applied to the port marked "V.C.". If the purge control valve begins to open at pressure between 180 to 220 mmHg (7.1 to 8.7 in.Hg), the purge control valve is functioning normally.

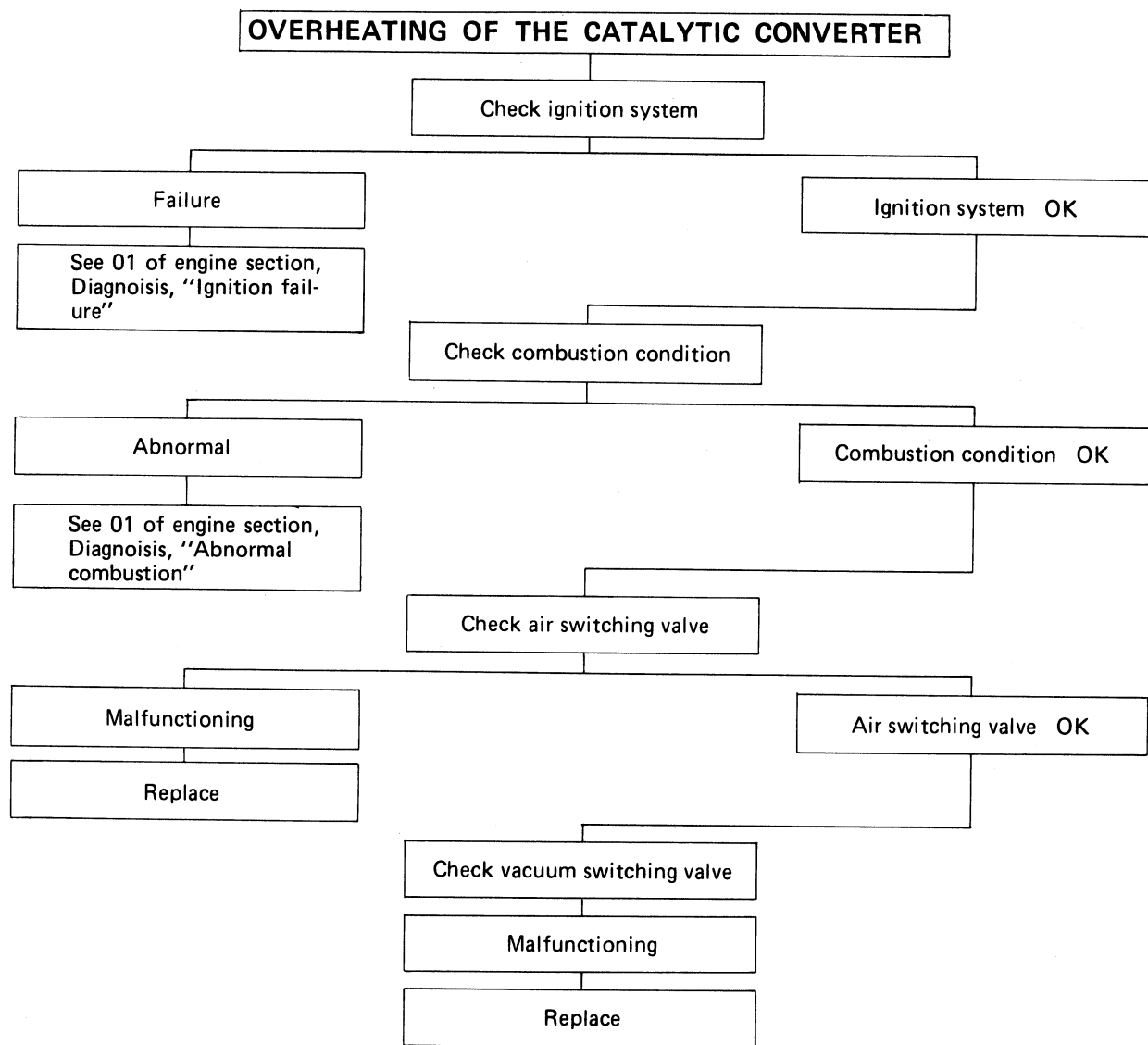
DIAGNOSIS

DIAGNOSIS OF EXCESSIVE EMISSION









CLOSED LOOP EMISSION CONTROL SYSTEM DIAGNOSIS

GENERAL

The Closed Loop Emission Control System has a self-diagnostic system which will cause the "CHECK ENGINE" lamp on the instrument panel to remain "on" when engine is running. This is an indication that there is a fault in the system. If this is the problem, refer to the Diagnostic Circuit Check (Fig. E-2)

Before suspecting a problem in the Closed Loop Emission Control System and it is not "CHECK ENGINE" lamp related, refer to "Engine Performance Diagnosis" for complete diagnosis.

When diagnosing the System, open circuits are often difficult to locate by sight because oxidation or terminal misalignment are hidden by the connectors. Merely wiggling a connector on a sensor or in the wiring harness may correct the open circuit condition. This should always be considered when an open circuit or failed sensor is indicated while troubleshooting the System.

The Closed Loop Emission Control System diagnosis starts in sequence with the following charts:

1. Diagnostic Circuit Check chart.
2. Driver Complaint
3. System Performance Check chart

It is important that these charts be followed in a step-by-step sequential procedure without leaving out a step or assuming the solution to the problem. If charts are not followed, the system will be improperly diagnosed.

Although there are many charts and trouble codes connected with the system diagnostics, only two charts are needed to prove the system is properly operating. Normally, only three charts are needed to diagnose and repair a problem.

If the ECM connectors need to be disconnected during diagnosis, be sure that the ignition switch is in the "OFF" position before disconnecting a connector.

Fig. E-1 summarizes the system diagnosis procedure.

DIAGNOSTIC CIRCUIT CHECK

The Diagnostic Circuit Check (Fig. E—2) makes sure that the self-diagnostic system works, determines the trouble codes to be displayed and guides diagnosis to other problem areas.

With the engine running and if a problem develops in the system the "CHECK ENGINE" lamp will come "on" and a trouble code will be stored in the ECM "Trouble Code Memory". The lamp will remain "on" with engine running as long as there is a problem. If the problem is intermittent, the "CHECK ENGINE" lamp will go out but the trouble code will be stored in the ECM trouble code memory.

With ignition turned "ON" and engine stopped, the "CHECK ENGINE" lamp should be "ON". This is a bulb check to indicate that the lamp is working.

A trouble code "test" lead (white cable) and a ground lead (black cable) are branched from a harness at a distance of 200mm (8 in.) from ECM connector.

With the ignition "ON", connect the "test" lead to the ground lead.

The "CHECK ENGINE" light will begin to flash a Trouble Code "12". Code 12 consists of one flash, a short pause, then two flashes. There will be a longer pause and Code 12 will repeat two more times. This check indicates that the self-diagnostic system is working. The cycle will then repeat itself until the engine is started or the ignition is turned "OFF". If more than one fault is stored in memory, the lowest number code will flash three times followed by the next highest code number, until all faults have been flashed. The faults will then repeat in the same order. Remove ground from test terminal before starting engine.

A trouble code indicates a problem in a given circuit (i.e., trouble code 14 indicates a problem in the coolant sensor circuit. This includes the coolant sensor, connector, harness and Electronic Control Module (ECM)). The procedure for finding the problem can be found in Diagnosis Trouble Code Chart 14. Charts are provided for each trouble code.

When the engine is started, the "CHECK ENGINE" light will go "OFF". If the "CHECK ENGINE" light remains ON, the self-diagnostic system has detected a fault.

If a trouble code can be obtained when the "CHECK ENGINE" light is OFF with the engine running, the trouble code must be evaluated. A determination must be made to see if the fault is intermittent or if the engine must be at certain operating conditions to turn the "CHECK ENGINE" light ON.

Faults indicated by trouble codes 13, 31, 44 and 45 require engine operation at part throttle for up to five minutes after engine warm-up before the "CHECK ENGINE" light will come on and store a trouble code.

The fault indicated by trouble code 15 takes five minutes of engine operation before it will display. The diagnostic charts for trouble codes 13, 15, 31, 44 and 45 should be used if any of these trouble codes can be obtained. Remove ground from test terminal before starting engine.

CLEARING TROUBLE CODE MEMORY

The trouble code memory is fed a continuous 12 volts even with key in "OFF" position. After a fault has been corrected, it will be necessary to remove this voltage for 10 seconds to clear any stored codes. Voltage can be removed by removing "ECM" fuse.

DRIVER COMPLAINT

After performing the Diagnostic Circuit Check and if there is no "CHECK ENGINE" light with a warm running engine, then refer to Driver Complaint (Fig. E-3) for an emission non-compliance problem or an engine performance problem (odor, surge, fuel economy.....).

SYSTEM PERFORMANCE CHECK

The System Performance Check (Fig. E-4) is used to check the operation of the M/C solenoid and the main metering circuit using tachometer, and to check the operation of the Closed Loop Emission Control System by the use of a dwell meter.

TROUBLE CODE IDENTIFICATION

Refer to Fig. E-5 for trouble code identification and to Fig. E-6 through Fig. E-18 for trouble code diagnostic charts.

OTHER SYSTEM DIAGNOSIS

The following charts are included in this manual to provide diagnosis of the systems that are controlled by the ECM.

- Idle and WOT Switches Circuit Check (Chart #4)
- Air Management Check (Fig. E-22)
- Idle and WOT Switches ASM, Check (Fig. E-23)
- Carburetor Mixture Control solenoid (Fig. E-24)

Fig. E-A

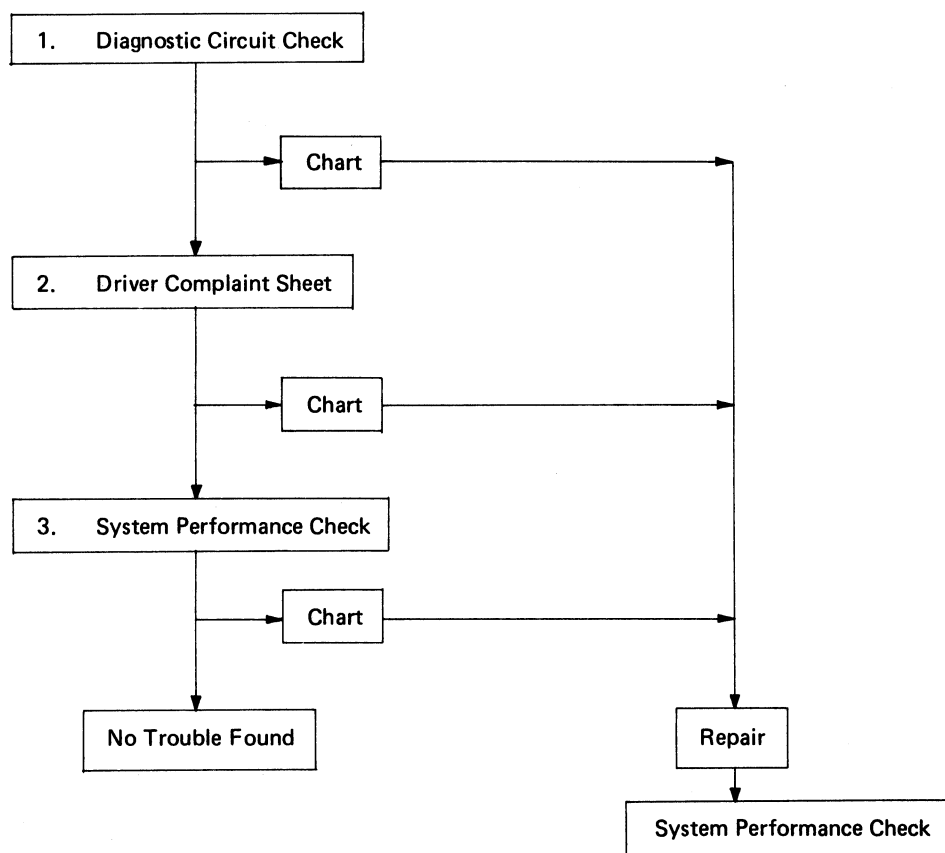
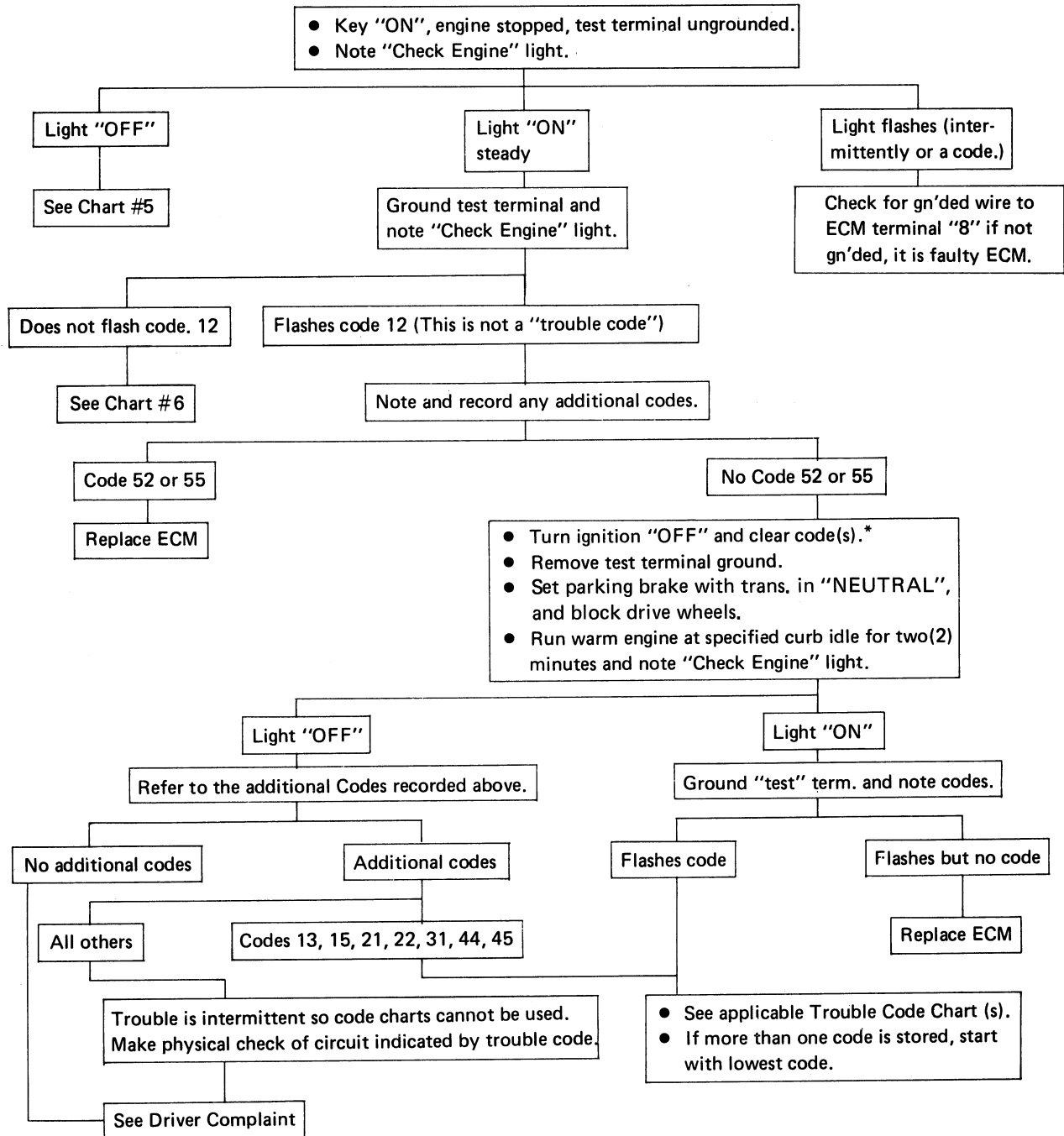
CLOSED LOOP EMISSION CONTROL SYSTEM DIAGNOSTIC PROCEDURE

Fig. E-1

DIAGNOSTIC CIRCUIT CHECK

Vacuum hose routing, connections and harness connector connections should be checked before this check.



* See Code(s) Clearing Procedure (Fig. E-A)

The system performance check should be performed after any repairs to the "System" have been made.

Fig. E-2

DRIVER COMPLAINT

Engine Performance Problem (Odor, Surge, Fuel Economy ...) Emission Problem

If the "CHECK ENGINE" light is not on, normal checks that would be performed on cars without Closed Loop Emission Control System should be done first.

If generator or coolant light is on with the "Check Engine" light, they should be diagnosed first.

Inspect for poor connections at coolant sensor, M/C solenoid, etc., and poor or loose vacuum hoses and connections, repair as necessary.

- Intermittent check engine light but no Trouble Code stored:

If for any reason engine rpm drops below 200, the check engine light will come on until rpm exceeds 200 and for 4 sec after rpm exceeds 200.

- Check for intermittent connection in circuit from:

- Distributor to ECM terminal "J"
- Battery to ECM terminal "F"
- ECM terminal "G" to engine ground
- ECM terminal "C" to Lamp Driver
- ECM terminal "D" to Battery (including ECM Relay circuit)

- Low battery voltage (Under 9 Volts) at ECM

- Loss of trouble code memory

Momentarily grounding dwell lead with engine idling should give code 23 which should be retained after engine is stopped and ignition turned to "on" position. If voltage is present at ECM term "F" but no code is stored, ECM is defective.

- Stalling, rough idle or improper idle speed

Refer to idle speed adjustment procedure.

Check — carburetor mixture control solenoid. (Fig. E-24).

- Detonation

Check - EGR operation and vacuum switch enrichment circuit (Chart #4).

- Surge

See Fig. E-23 — Idle and WOT switches assembly check.

- Poor performance and/or fuel economy

See Fig. E-24 — carburetor mixture control solenoid. (Fig. E-24).

- Poor full throttle performance

See chart #4 — vacuum switch enrichment circuit check.

See Fig. E-24 — carburetor mixture control solenoid. (Fig. E-24).

- All other complaints

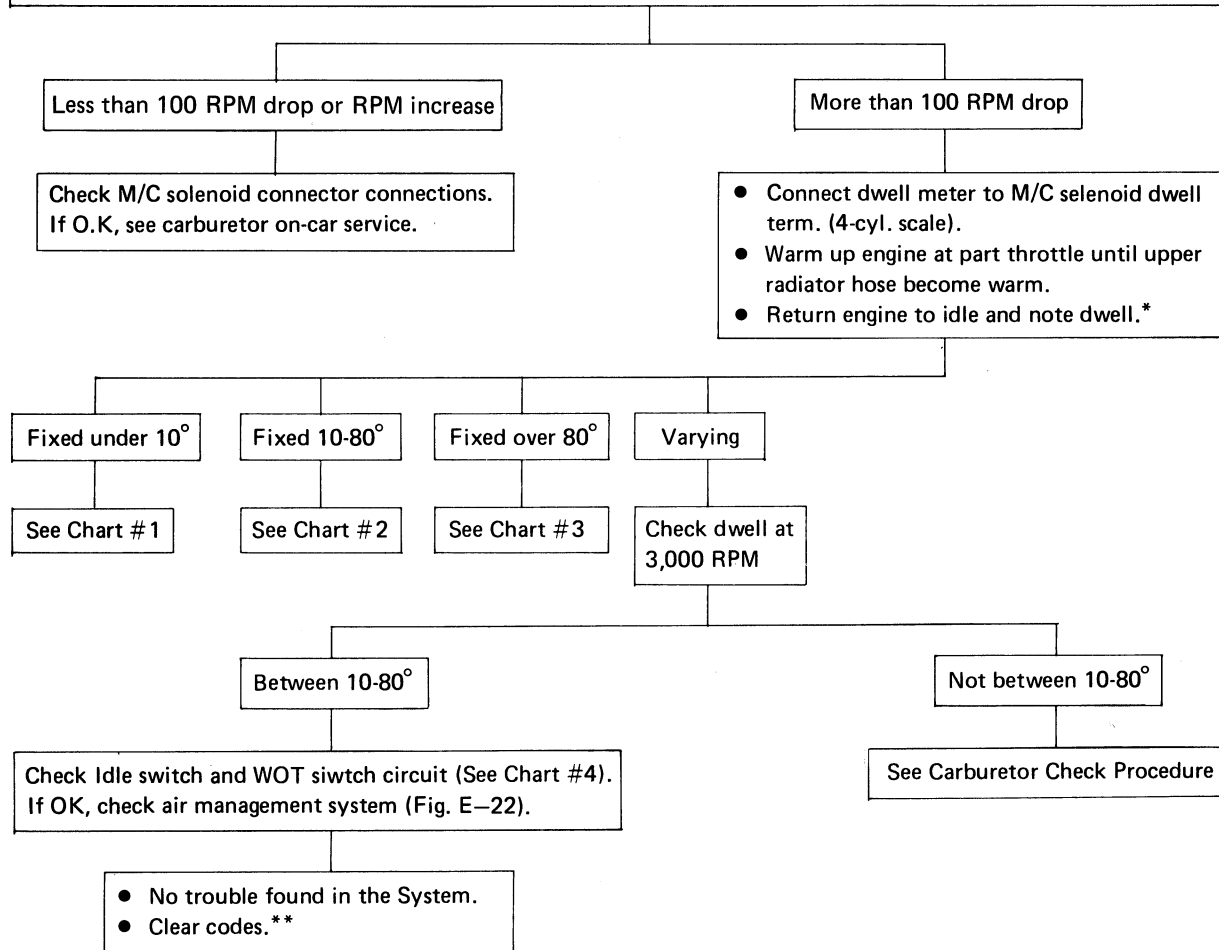
Make "System Performance Check" on warm engine (upper radiator hose hot).

The "System Performance Check" should be performed after any repairs to the "System" have been made.

Fig. E-3

SYSTEM PERFORMANCE CHECK

1. Set parking brake with trans. in "NEUTRAL", and block drive wheels.
2. Start engine.
3. Disconnect purge hose from canister and plug it.
4. Connect tachometer.
5. Disconnect carburetor mixture control (M/C) Solenoid and ground M/C Solenoid dwell terminal.
6. Run engine at 3,000 RPM and, while keeping throttle constant, reconnect M/C Solenoid and note RPM.
7. Remove ground from M/C Solenoid dwell terminal before returning to idle.



* Oxygen sensors may cool off at idle and the dwell change from varying to fixed. If this happens, running the engine at fast idle will warm it up again.

** See Code(s) Clearing Procedure. (Fig. E-A)

Fig. E-4

CHART #1
DWELL FIXED UNDER 10°

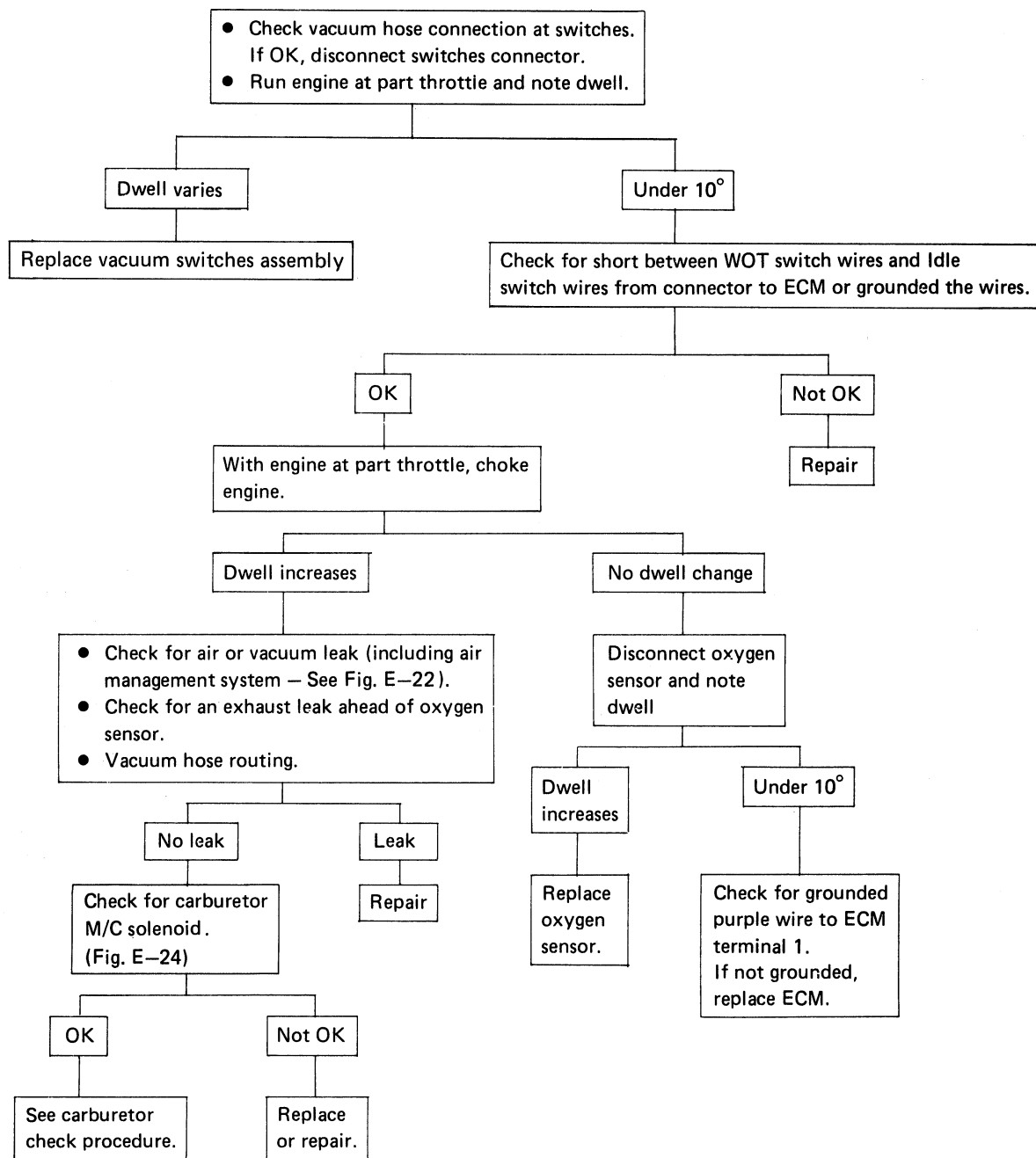


CHART #1

CHART #2

DWELL FIXED BETWEEN 10° ~ 80°

Open Coolant Sensor or Oxygen Sensor Circuit

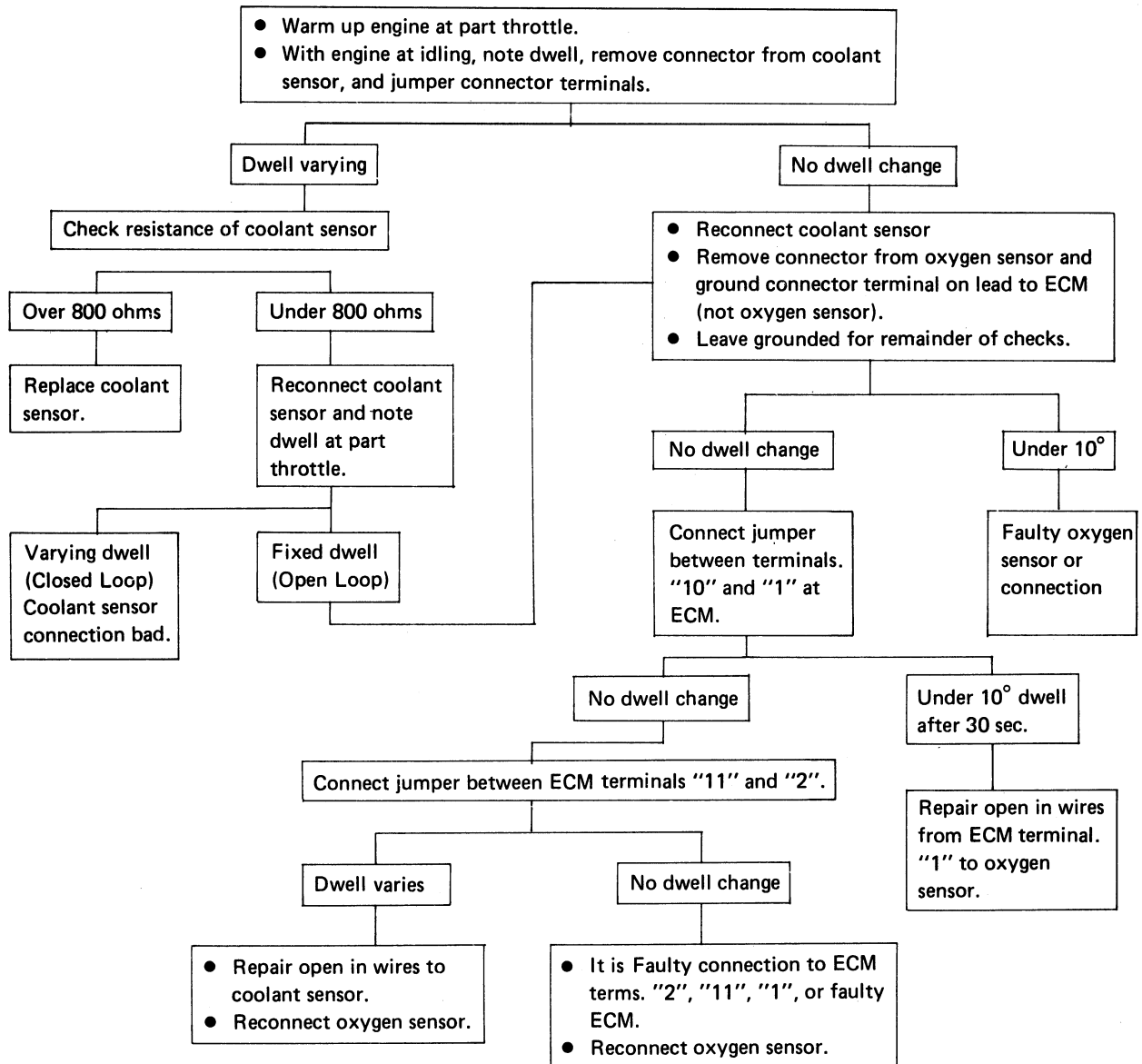


CHART #2

CHART #3
DWELL FIXED OVER 80°

Rich Engine Condition Indication

Note: A restricted air cleaner can cause a rich engine condition.

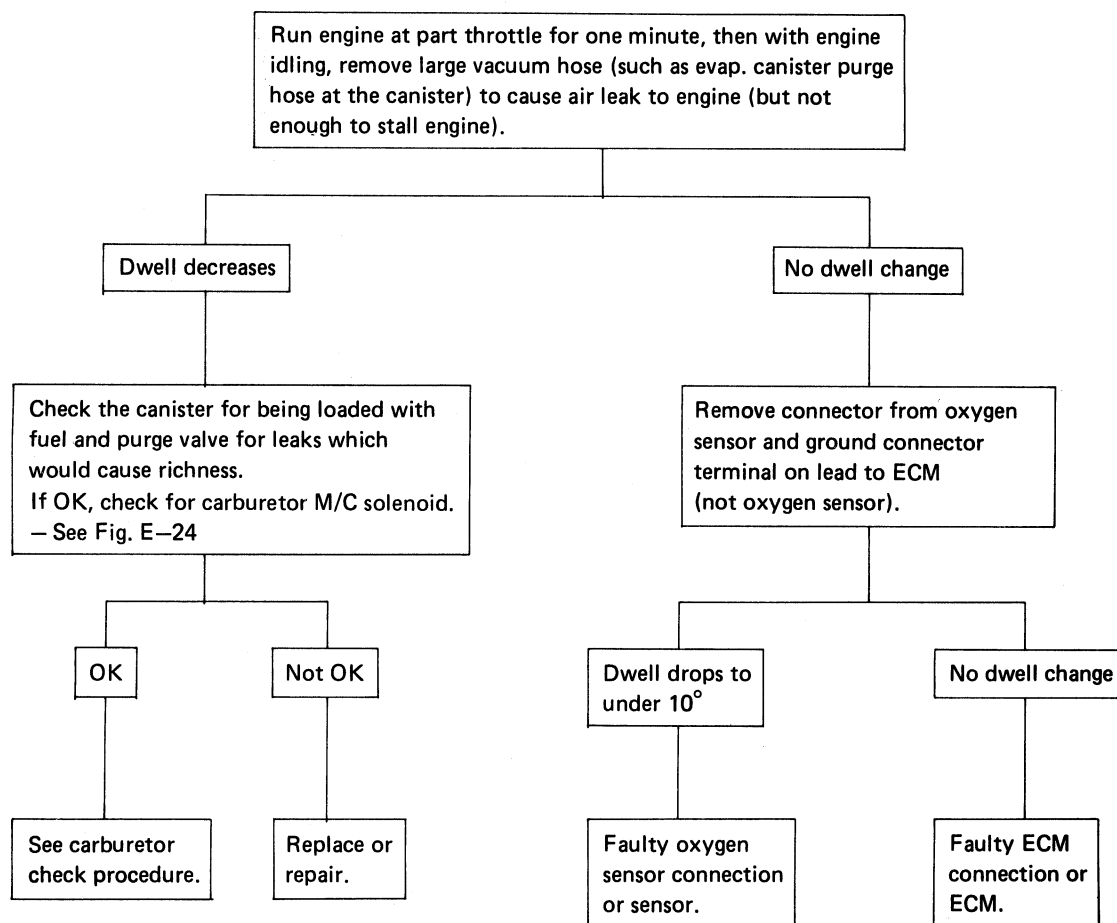


CHART #3

CHART #4
IDLE SWITCH AND WOT SWITCH CIRCUIT CHECK

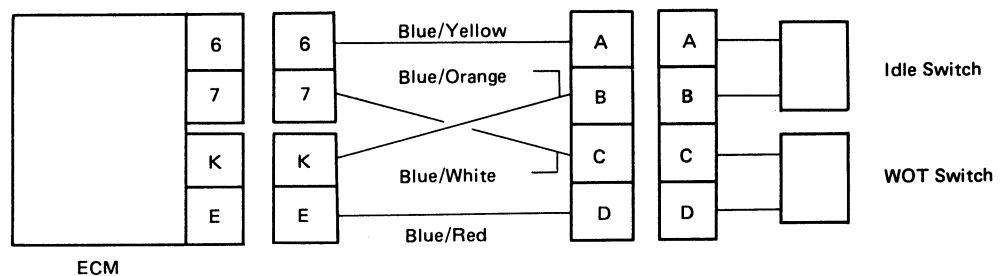
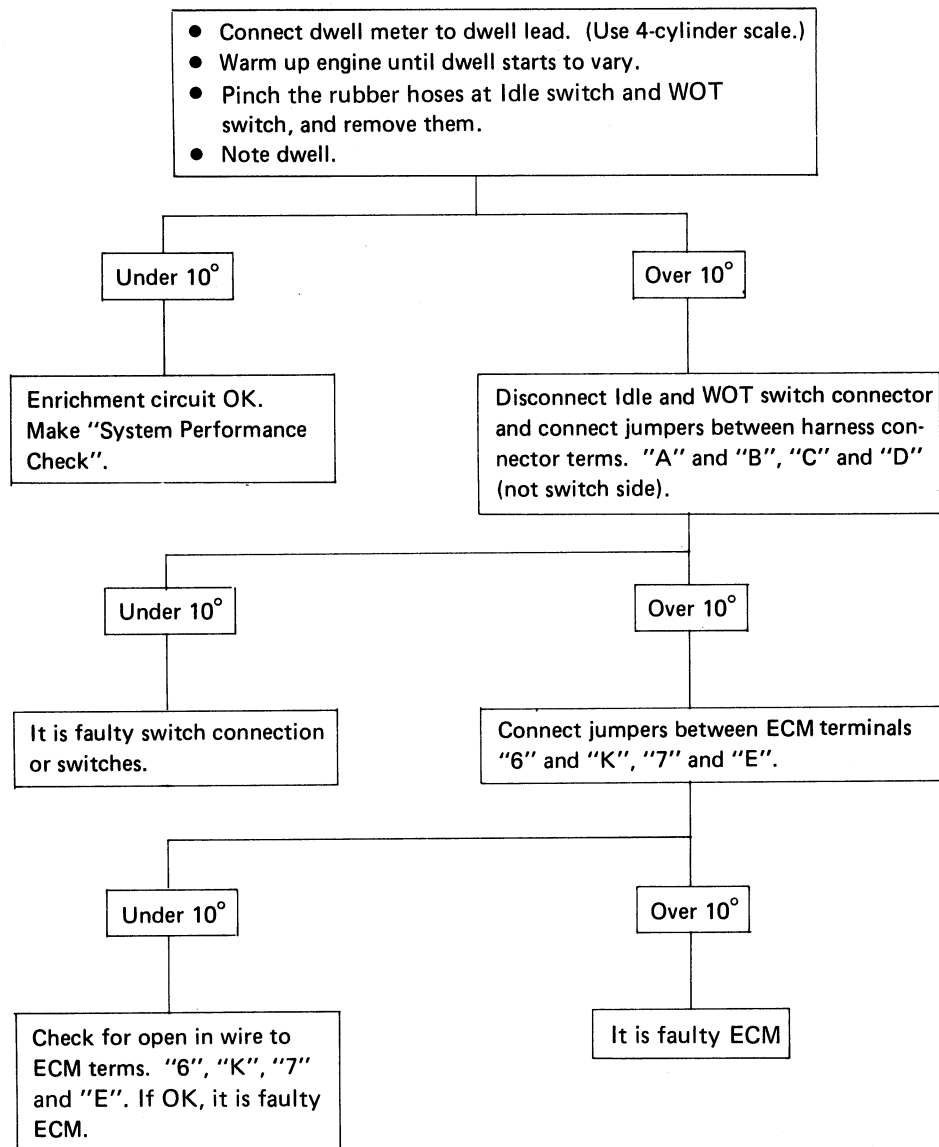
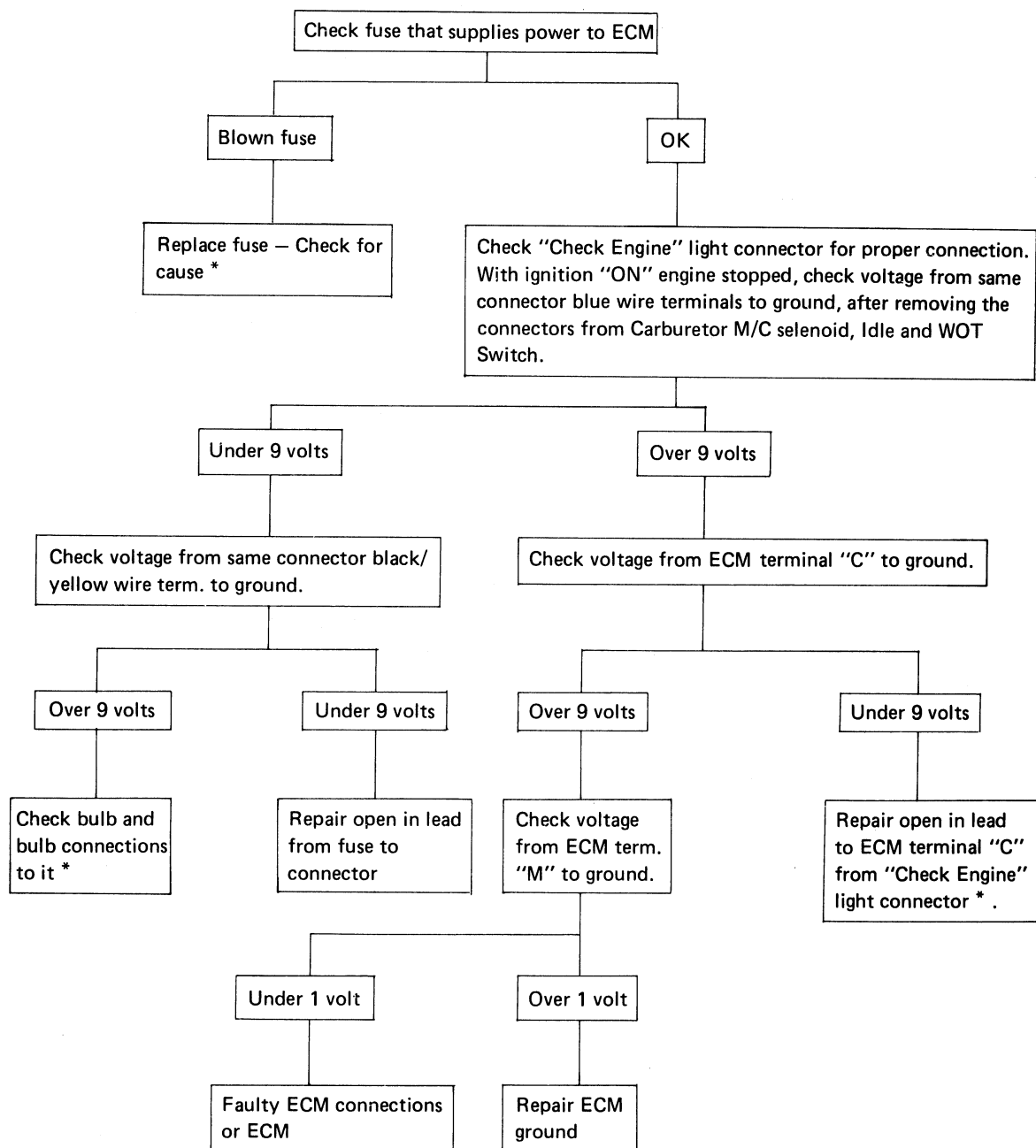


CHART #4

CHART #5

"CHECK ENGINE" LIGHT INOPERATIVE



* Continue Diagnostic Circuit Check after repair.

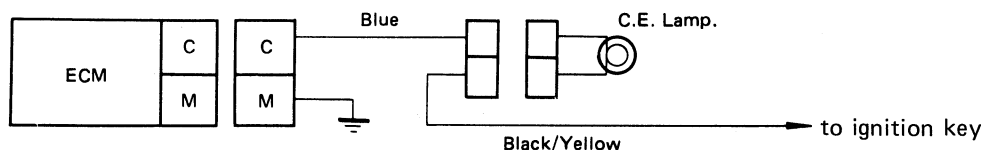


CHART # 5

CHART #6
WON'T FLASH CODE 12

Check fuse that supply power to ECM.

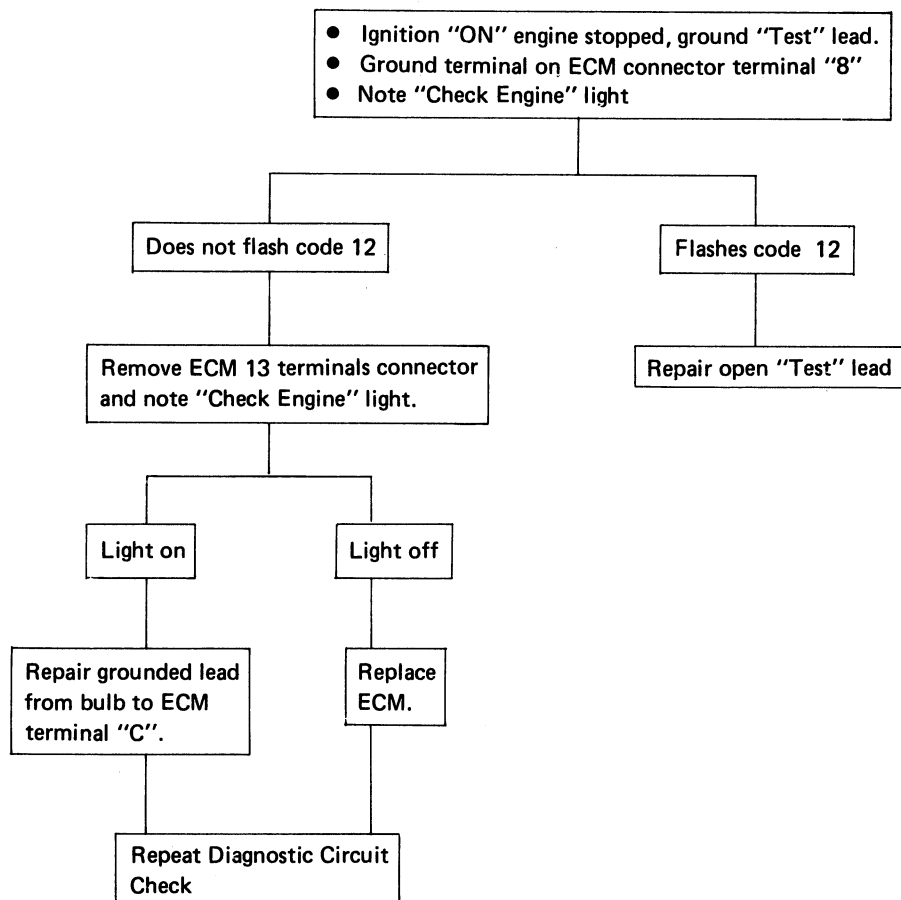
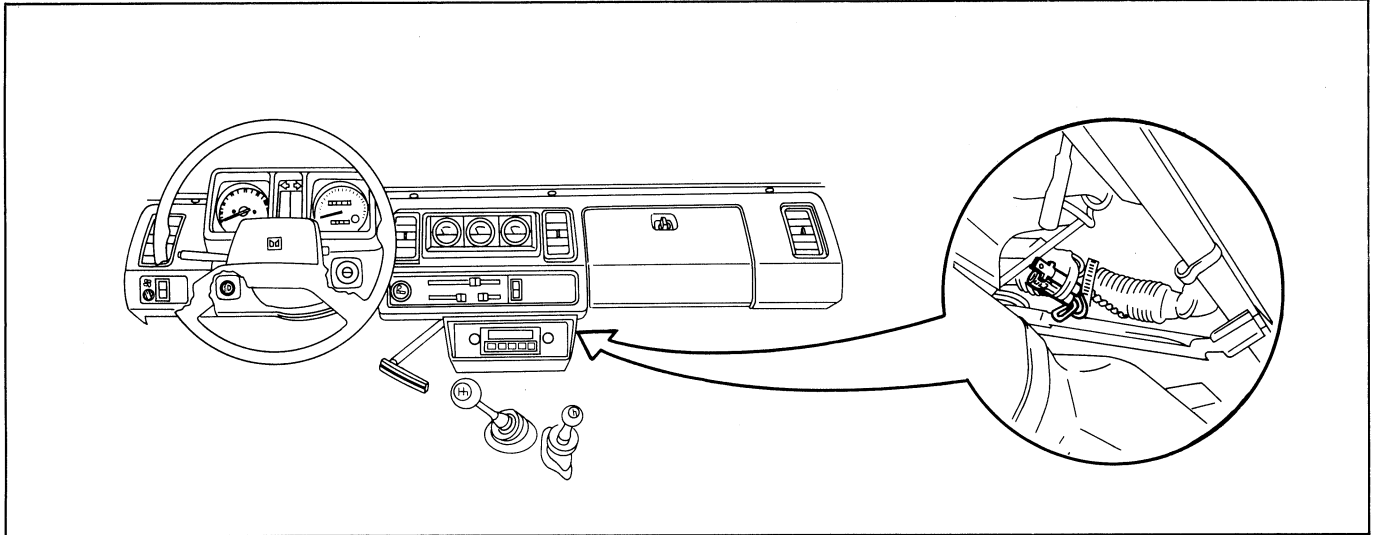


CHART # 6

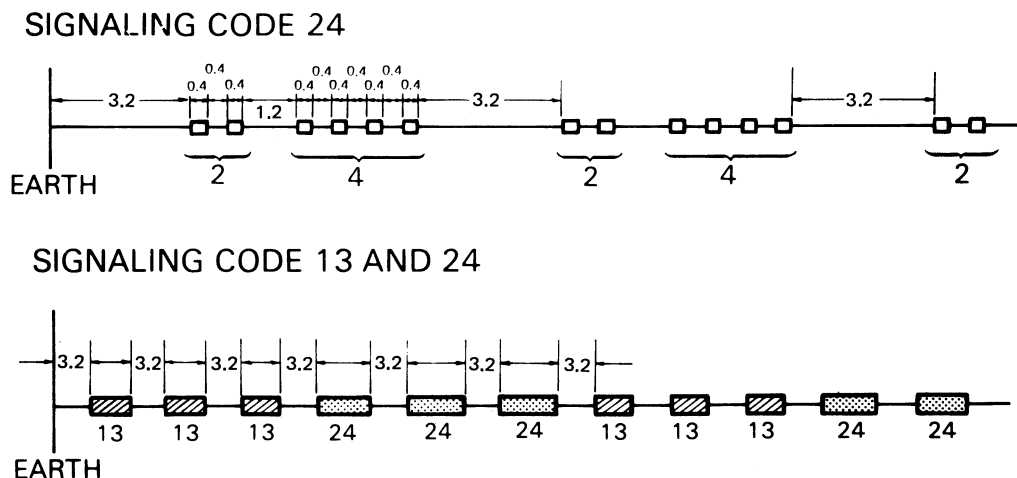
(It is important to keep the engine running while performing trouble diagnosis.)



For instance, the following light operates to indicate the malfunction code "24".



The blinking consists of the patterns shown in the Fig. E-1, and individual pattern will repeat to indicate abnormality. When more than one abnormalities take place, related patterns will repeat 3 times each. Having completed all the pertinent patterns, it returns to the initial pattern. Then the same is repeated.



TROUBLE CODE IDENTIFICATION

The "CHECK ENGINE" light will only be "ON" if the malfunction exists under the conditions listed below. If the malfunction clears, the light will go out and a trouble code will be set in the ECM. Code 12 does not store in memory. If the light comes "on" intermittently, but no code is stored, go to the "Driver Complaint" section. Any codes stored will be erased if no problem reoccurs within 50 engine starts.

The trouble codes indicate problems as follows:

TROUBLE CODE 12	No ignition reference pulses to the ECM. This code is not stored in memory and will only flash while the fault is present.
TROUBLE CODE 13	Oxygen sensor circuit — The engine must run 1 minute at part throttle, under road load, before this code will set. This code does not set when the coolant temperature is below 70°C and/or the time since engine start has exceeded 2 minutes.
TROUBLE CODE 14	Shorted coolant sensor circuit — The engine must run 2 minutes before this code will set.
TROUBLE CODE 15	Open coolant sensor circuit — The engine must run 5 minutes before this code will set.
TROUBLE CODE 21	Idle switch circuit open or WOT switch circuit shorted — The engine must run 10 seconds at following two conditions concurrently before this code will set. Idle switch output is in a low voltage state. WOT switch output is in a high voltage state.
TROUBLE CODE 22	Fuel cut solenoid circuit open or grounded — The engine must run under the decelerating condition over 2000 engine rpm before this code will set.
TROUBLE CODE 23	Mixture control solenoid circuit open or grounded.
TROUBLE CODE 25	Air switching solenoid circuit open or grounded.
TROUBLE CODE 31	No ignition reference pulses to the ECM to 10 seconds at part throttle, under load. This code will store in memory.
TROUBLE CODE 44	Lean oxygen sensor indication — The engine must run up to 2 minutes at part throttle, under load, before this code will set. This code does not set when the coolant temperature is below 70°C and/or the air temperature in air cleaner is below 0°C.
TROUBLE CODE 45	Rich System indication — The engine must run up to 2 minutes at part throttle, under load, before this code will set. This code does not set when the engine exceeds 2500 rpm and/or the coolant temperature is below 70°C and/or the barometric pressure is below 575 mmHg (above 2500m altitude).
TROUBLE CODE 51	Shorted fuel cut solenoid circuit and/or faulty ECM.
TROUBLE CODE 52	Faulty ECM — Problem of RAM in ECM.
TROUBLE CODE 53	Shorted air switching solenoid and/or faulty ECM.
TROUBLE CODE 54	Shorted vacuum control solenoid and/or faulty ECM.
TROUBLE CODE 55	Faulty ECM — Problem of A/D converter in ECM.

Fig. E-5

<u>Pin</u>	<u>Function</u>	<u>Pin</u>	<u>Function</u>
A	Mixture Control Solenoid	1	Oxygen Sensor Input
B	Carburetor Fuel Cut Solenoid	2	Coolant Temp. Sensor Input
C	System Malfunction Lamp	3	Not Used
D	Battery +	4	Earth
E	WOT Switch Ground	5	Barometric Switch Input
F	Battery + (Memory Back-up)	6	Idle Position Switch Input
G	Power Ground	7	WOT Switch Input
H	Not Used	8	Diagonose Decode
I	AIR Solenoid Output	9	Inlet air Temp. Switch and Barometric Switch Ground
J	Ignition Coil Tach. Input	10	Oxygen Sensor Ground
K	Idle Position Switch Ground	11	Coolant Temp. Sensor Ground
L	Not Used	12	Not Used
M	Control Ground	13	Inlet Air Temp. Switch Input
		14	Not Used
		15	Not Used
		16	Not Used
		17	Not Used

TROUBLE CODE 12
NO REFERENCE PULSES TO THE ECM

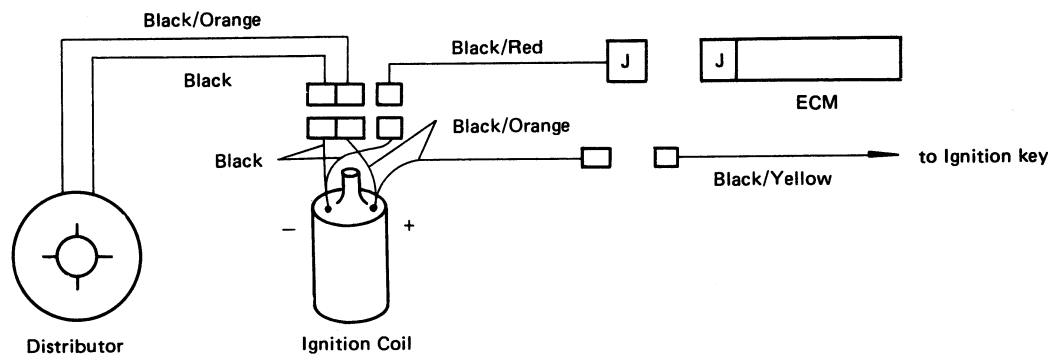
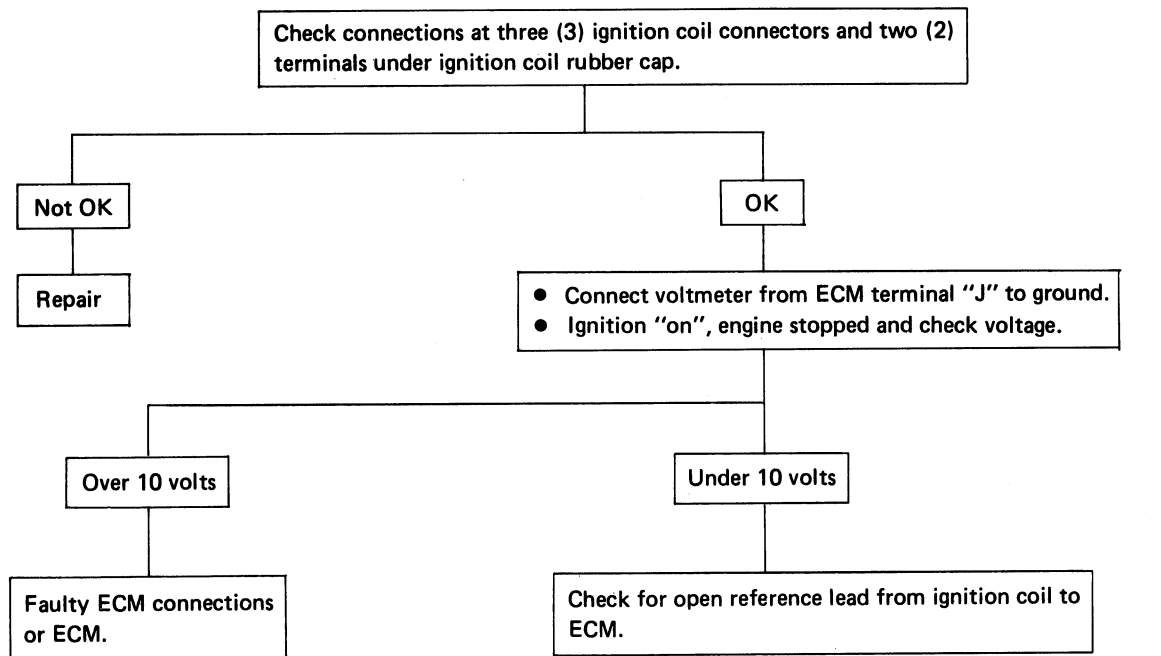


Fig. E-6

TROUBLE CODE 13
OPEN OXYGEN SENSOR CIRCUIT

If 13 and 23 are displayed, go to Trouble Code 23 Chart first.

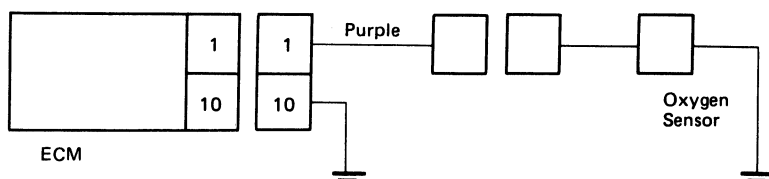
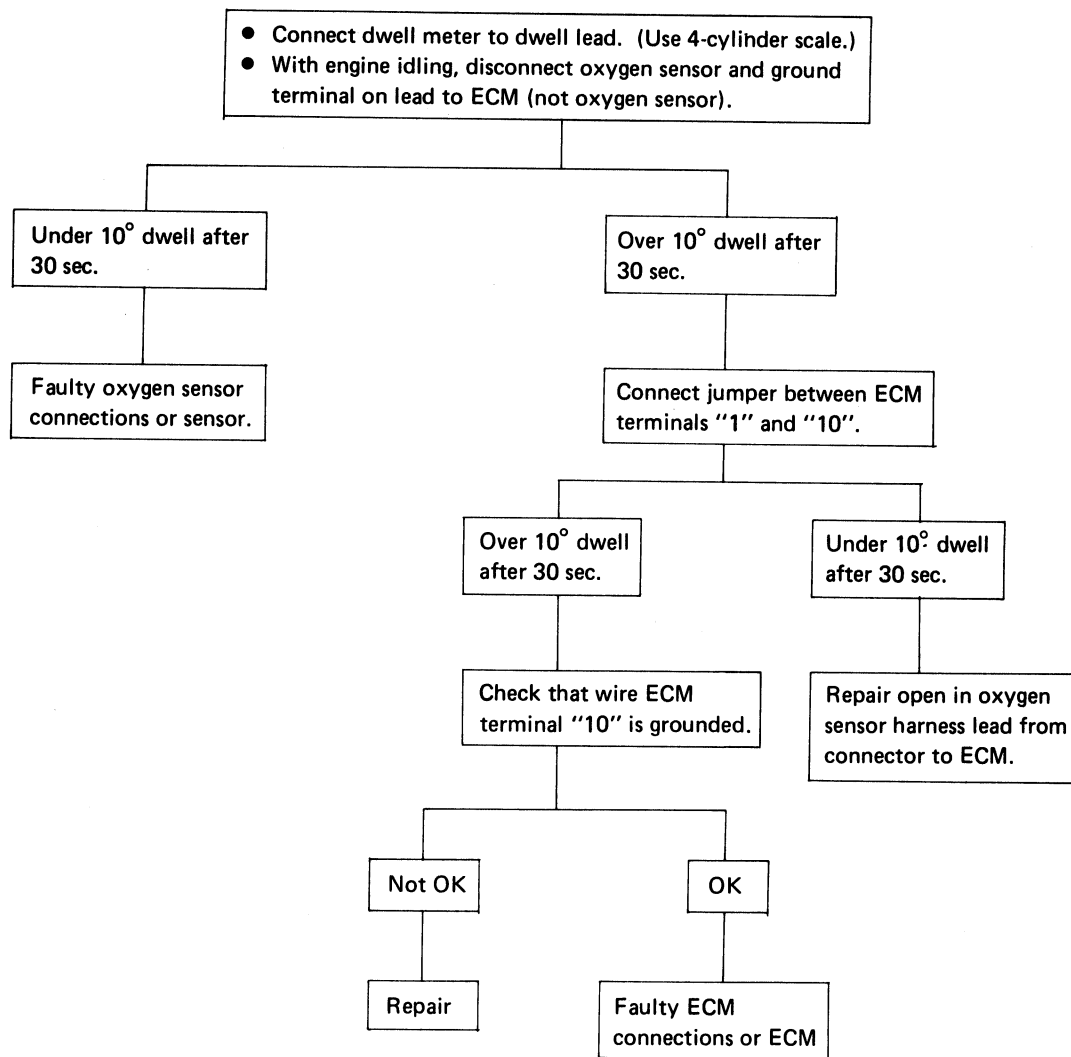


Fig. E-7

TROUBLE CODE 14
SHORTED COOLANT SENSOR CIRCUIT

Check for engine overheating condition before making following test.

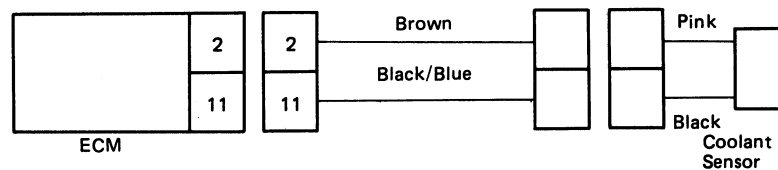
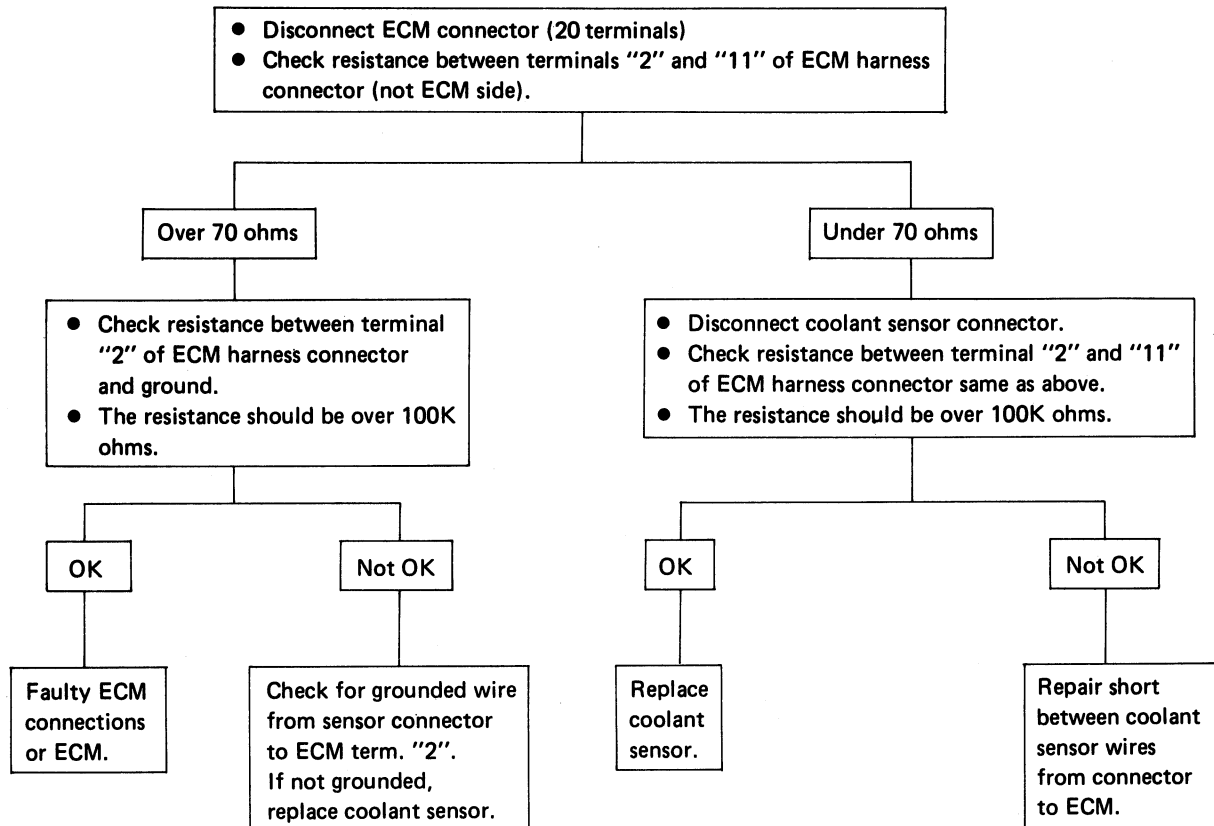


Fig. E-8

TRUBLE CODE 15
OPEN COOLANT SENSOR CIRCUIT

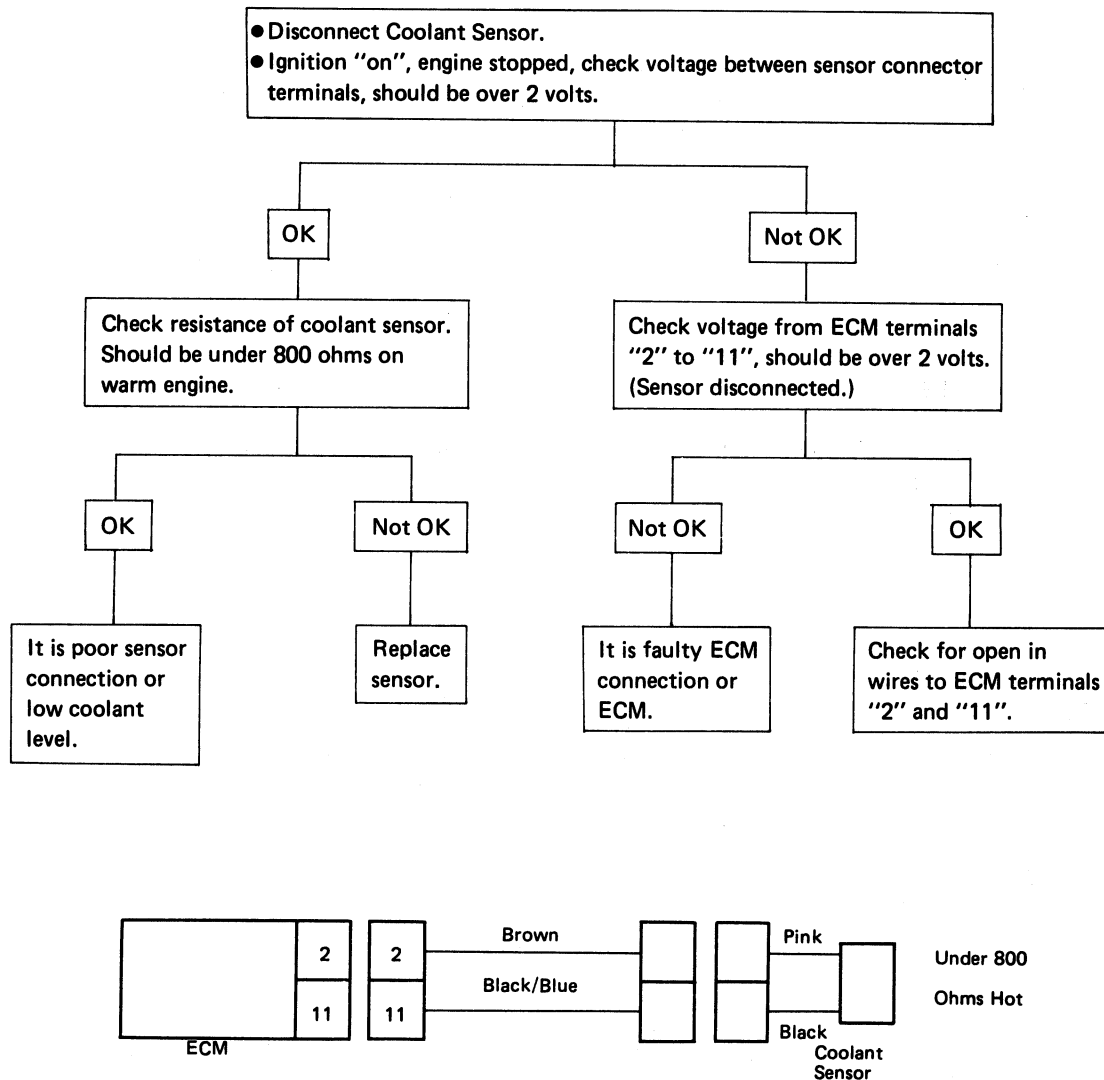


Fig. E-9

TROUBLE CODE 21

IDLE SWITCH CIRCUIT OPEN OR WOT SWITCH CIRCUIT SHORTED

If 21 and 23 are displayed, go to Trouble Code 23 Chart first.

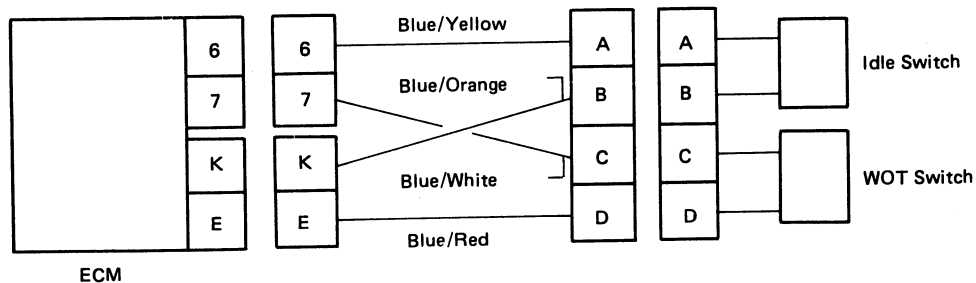
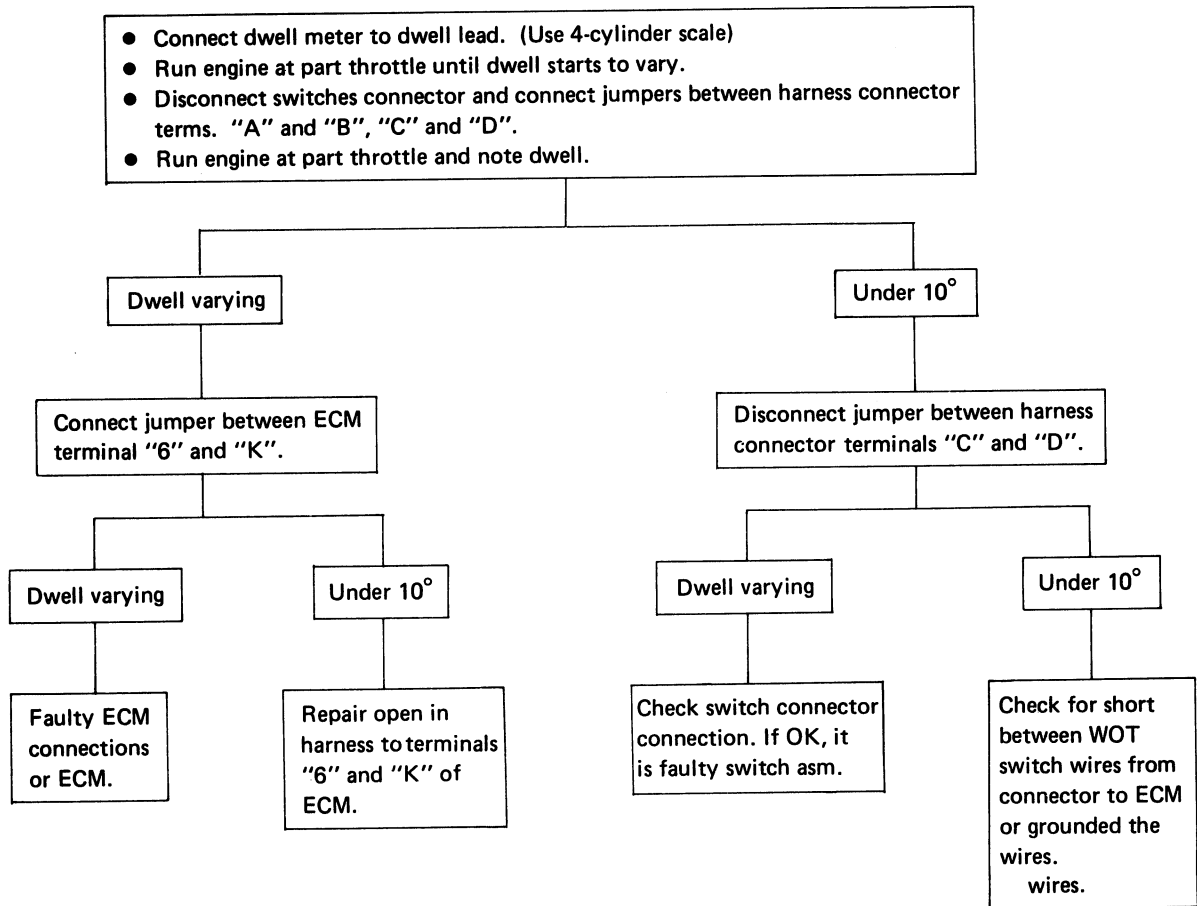
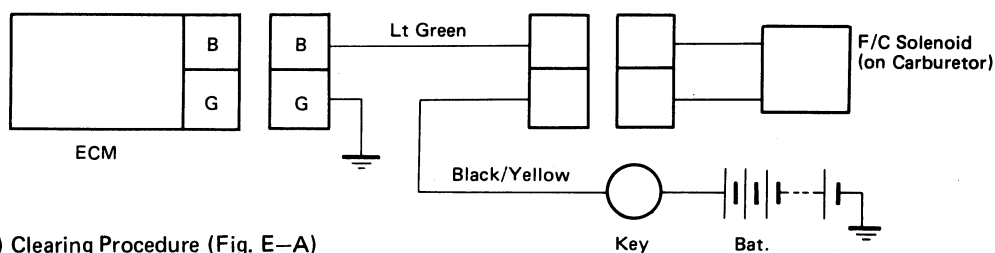
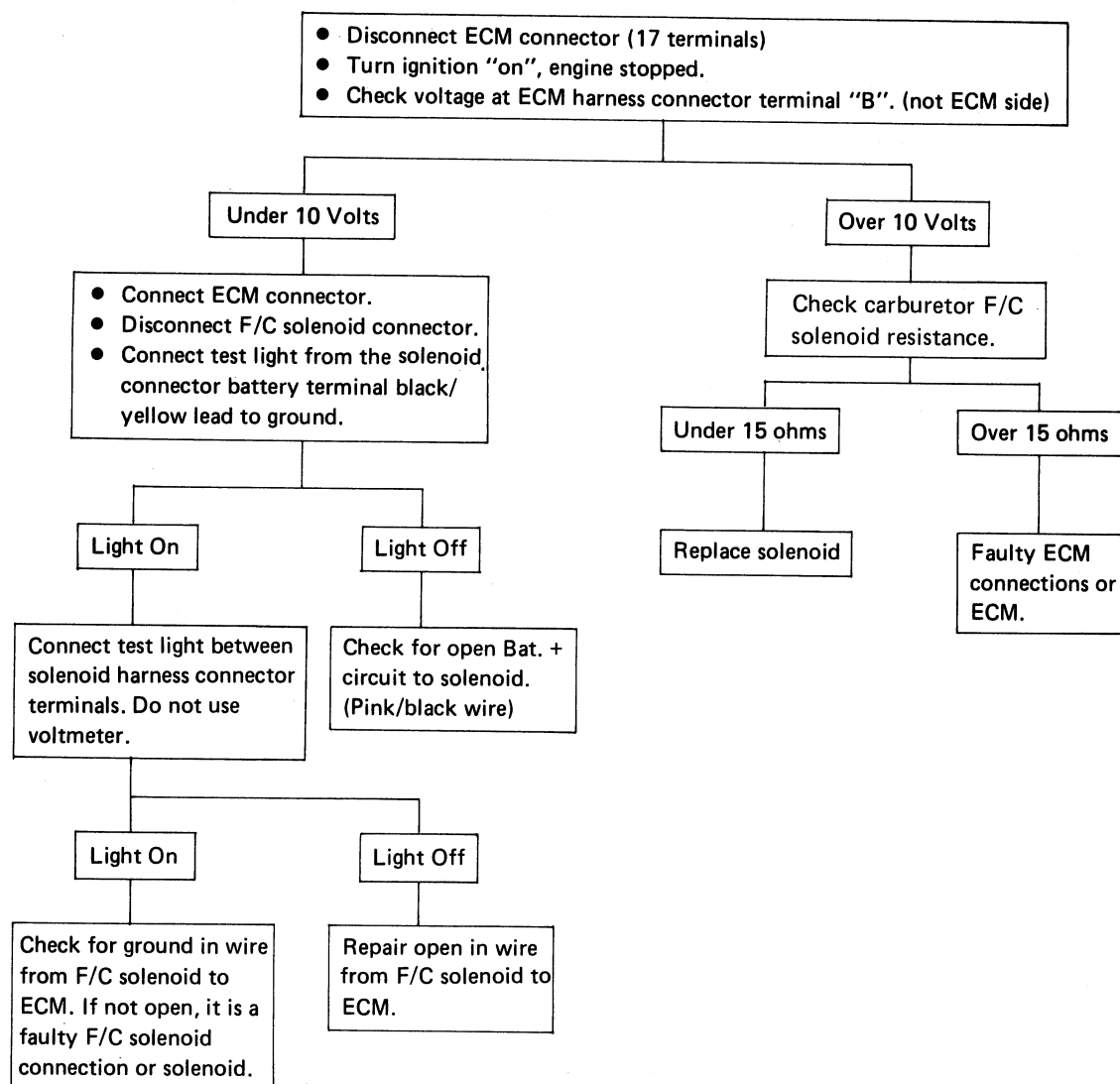


Fig. E-10

TROUBLE CODE 22

FUEL CUT (F/C) SOLENOID CIRCUIT OPEN OR GROUNDED

Check connection at carburetor F/C solenoid. If OK, clear code(s)* and recheck for code(s). If no code 22, circuit is OK.



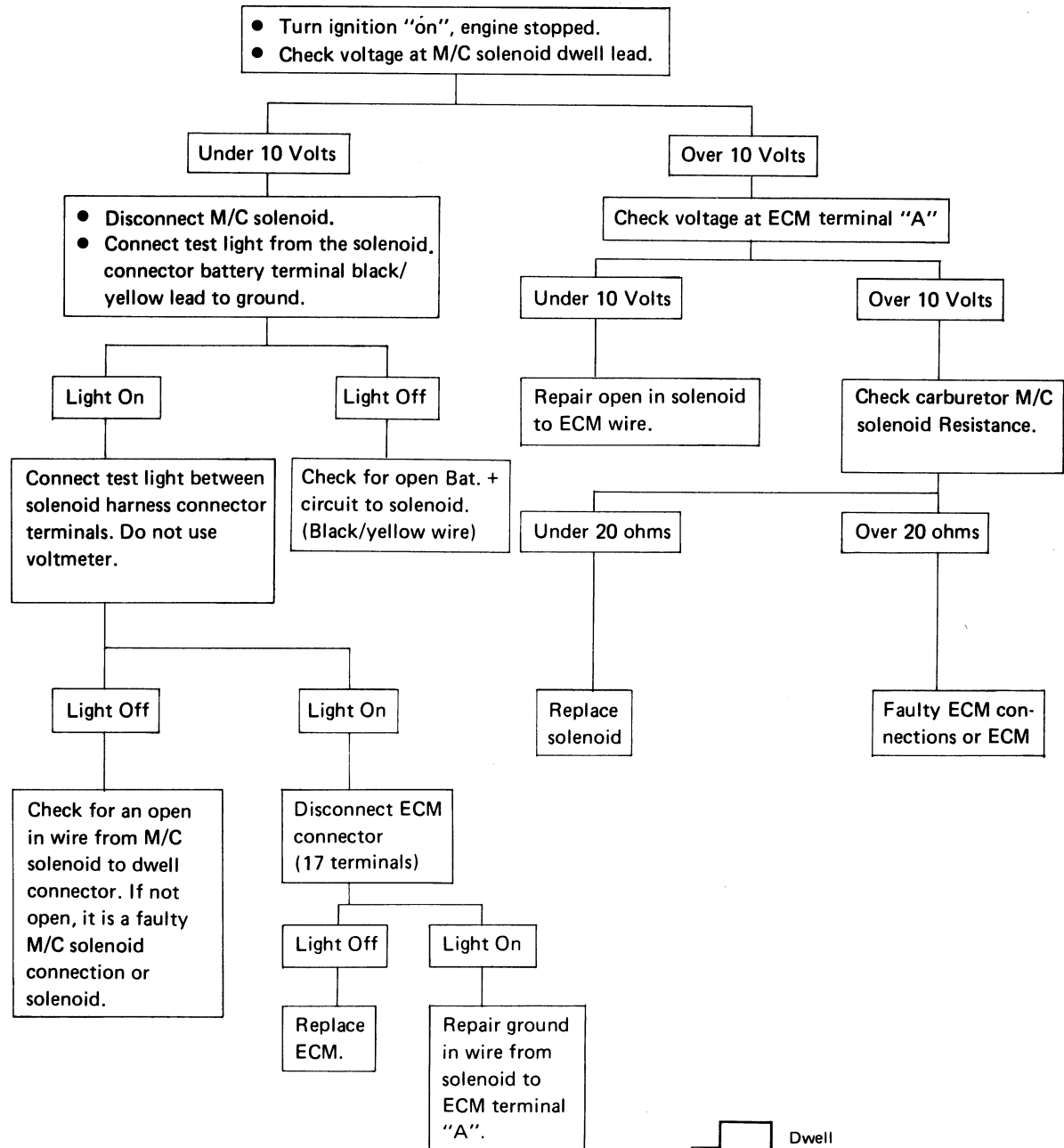
* See Code(s) Clearing Procedure (Fig. E-A)

Fig. E-11

TROUBLE CODE 23

VACUUM CONTROL (M/C) SOLENOID CIRCUIT OPEN OR GROUNDED

Check connections at M/C solenoid. If OK, clear code(s)* and recheck for code(s). If no code 23, circuit is OK.



* See Code(s) Clearing Procedure. (Fig. E-A)

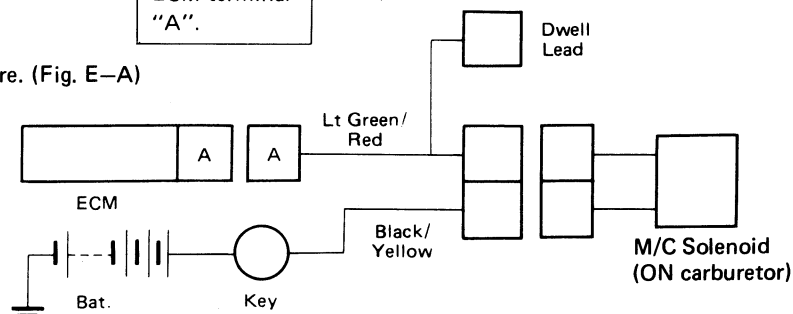
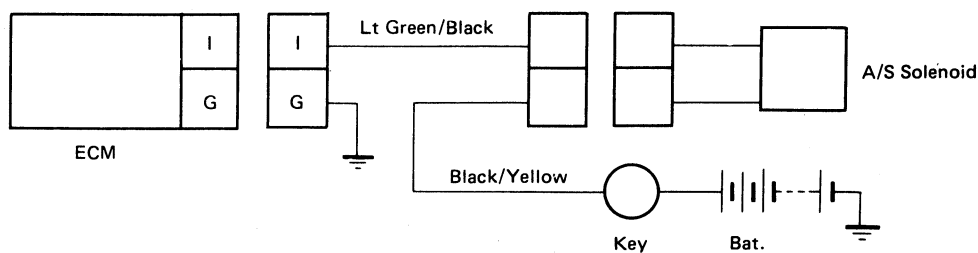
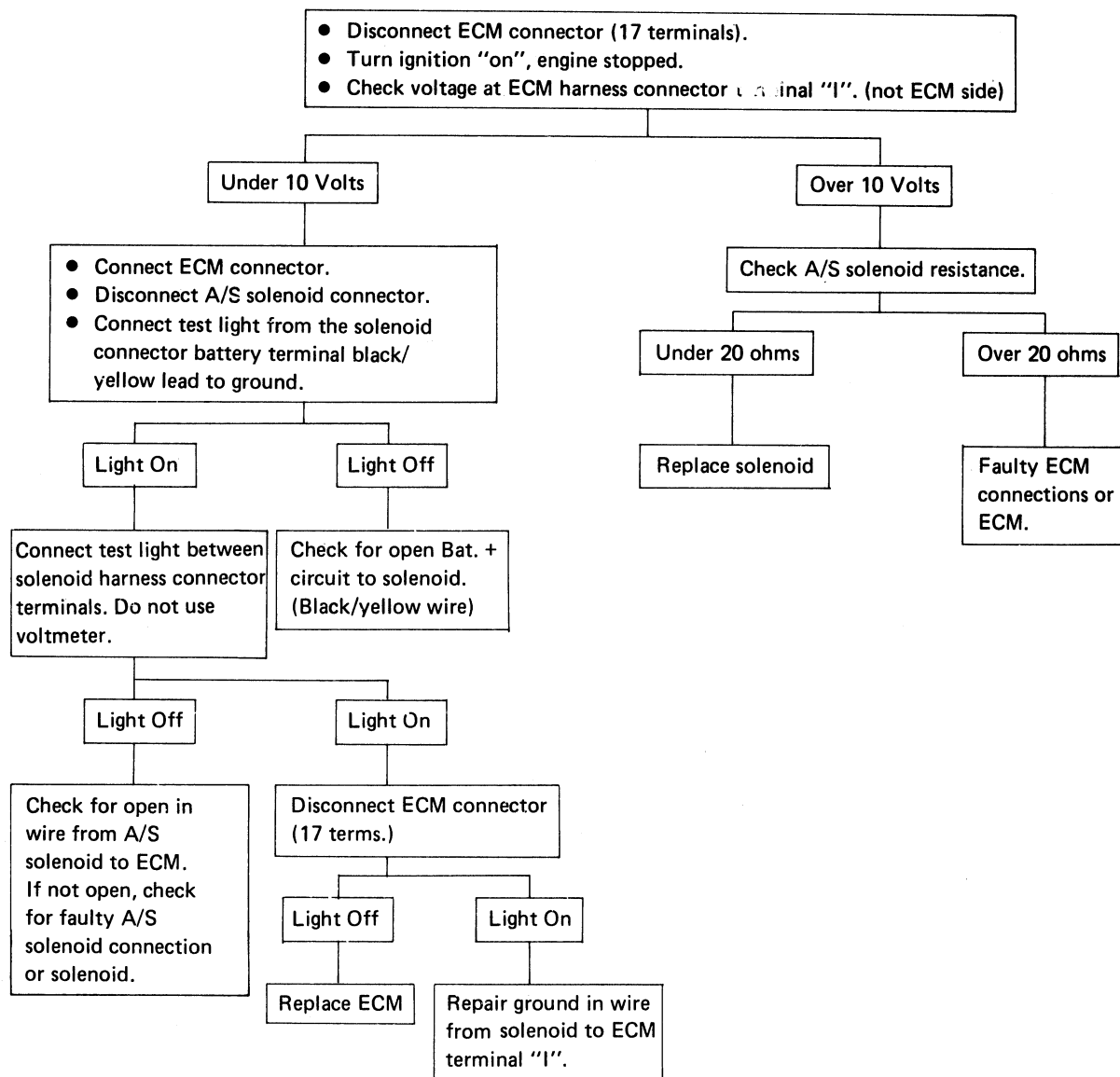


Fig. E-12

TROUBLE CODE 25

AIR SWITCHING (A/S) SOLENOID CIRCUIT OPEN OR GROUNDED

Check connection at A/S solenoid. If OK, clear code(s)* and recheck for codes(s). If no code 25, circuit is OK.



* See Code(s) Clearing Procedure (fig. E-A)

Fig. E-13

TROUBLE CODE 31
NO REFERENCE SIGNAL

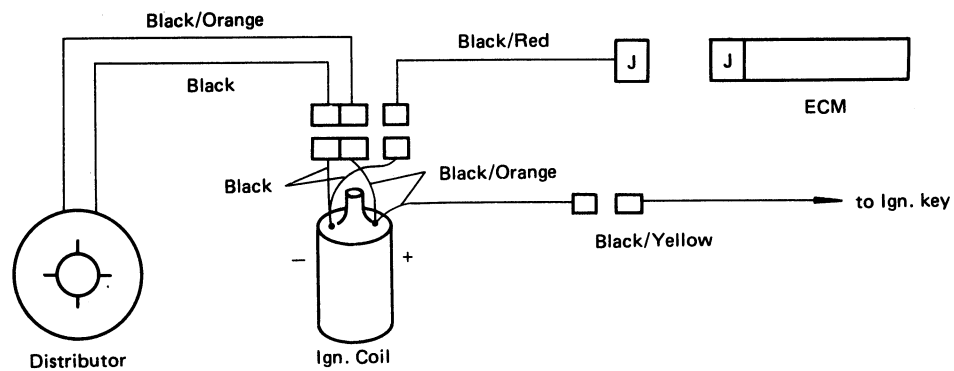
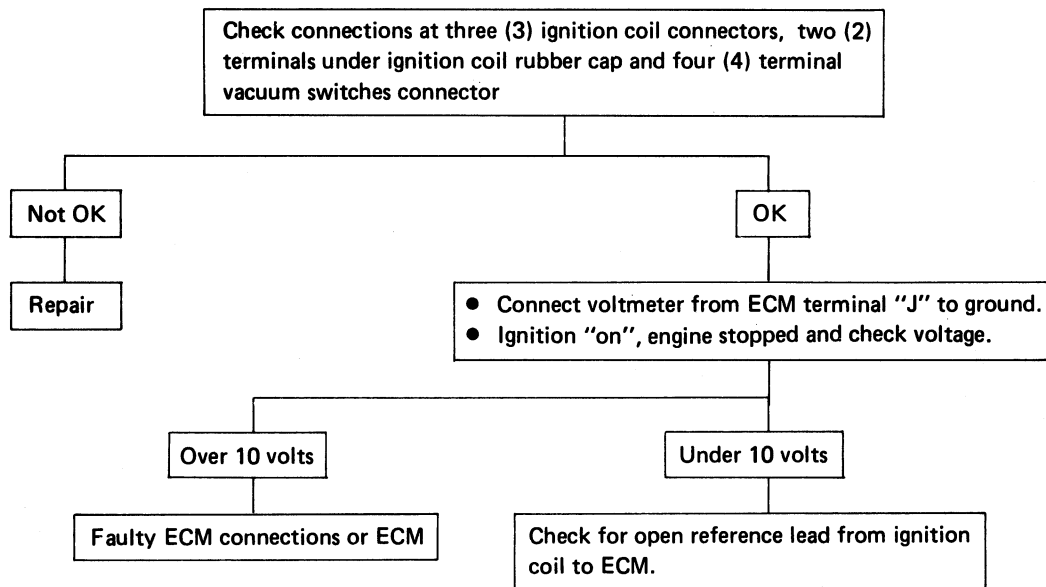


Fig. E-14

TROUBLE CODE 44

OXYGEN SENSOR — LEAN INDICATION

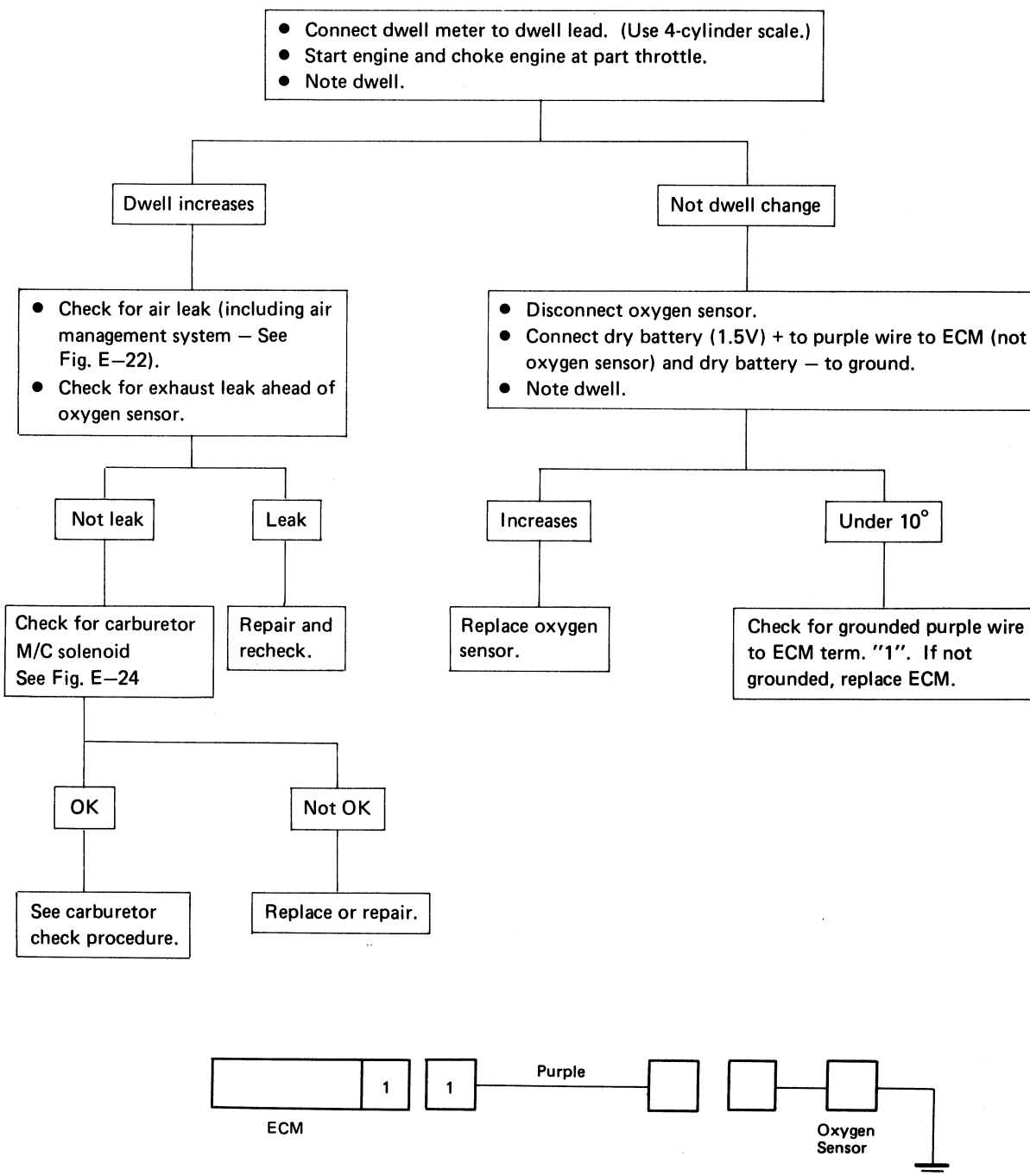


Fig. E-15

TROUBLE CODE 45
OXYGEN SENSOR – RICH INDICATION

Note: A restricted air cleaner can cause a code 45.

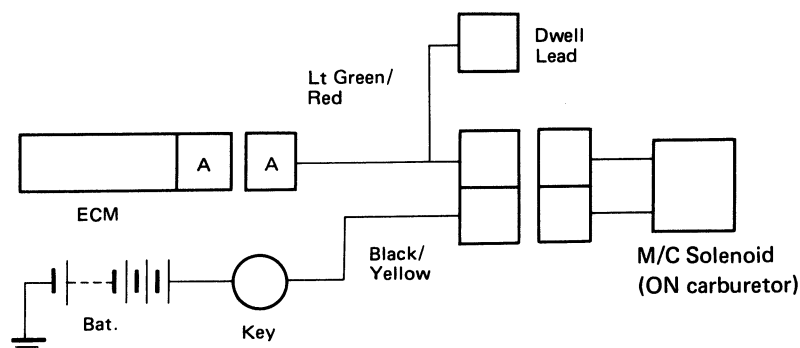
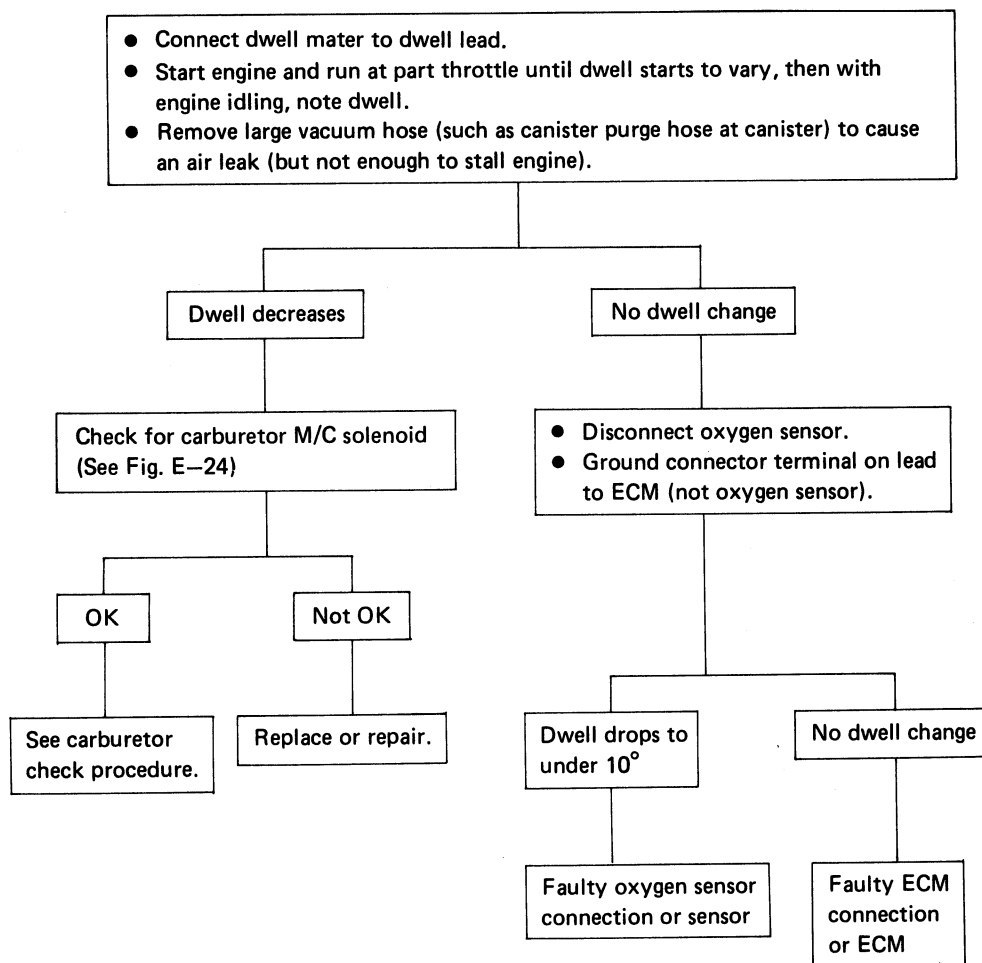
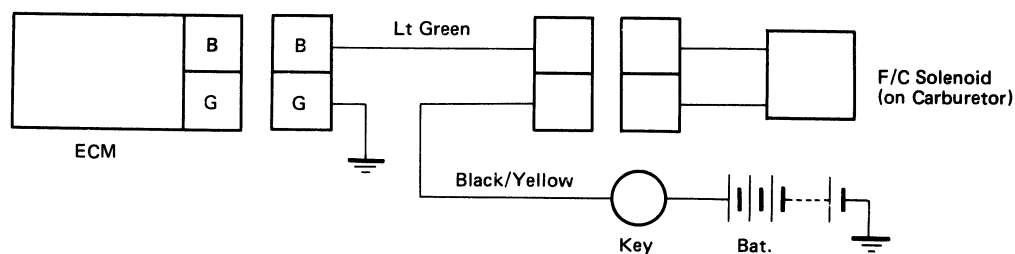
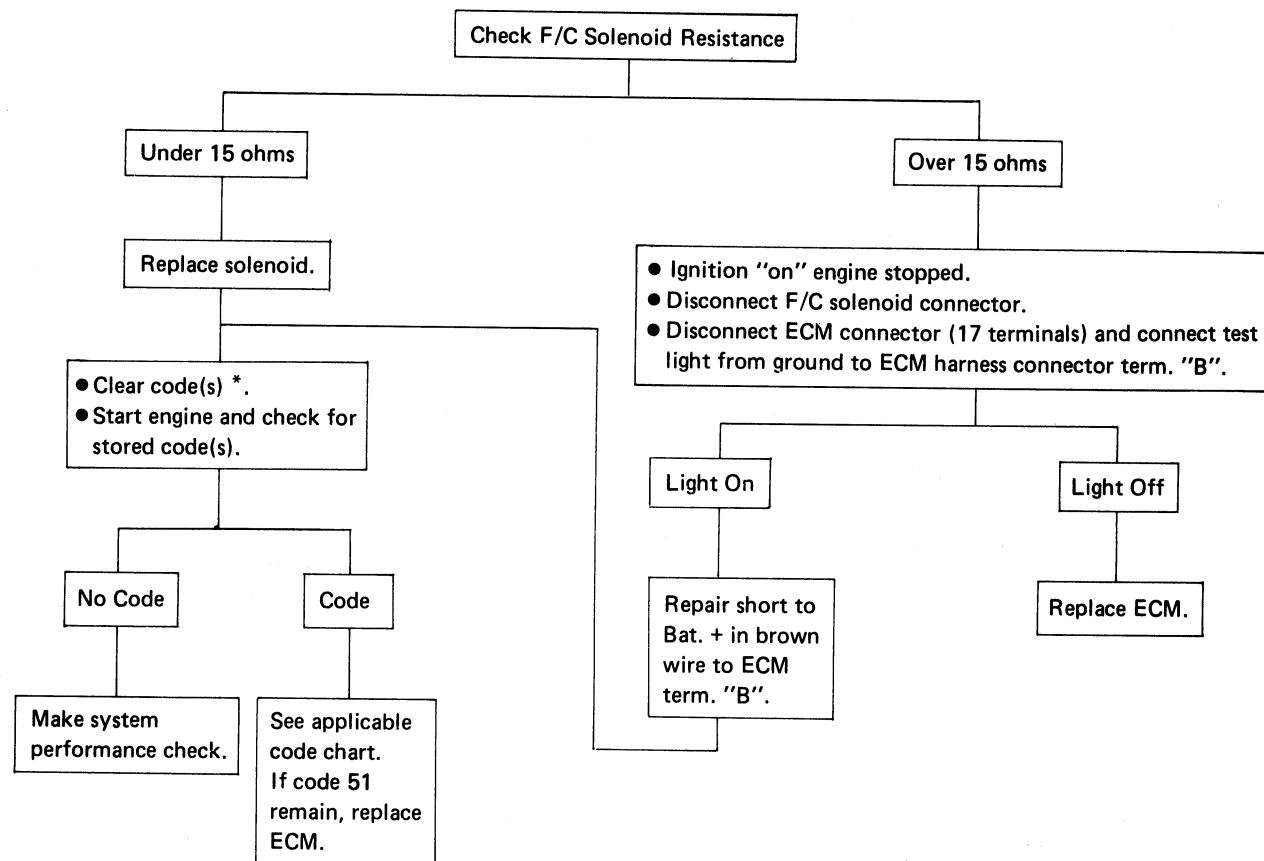


Fig. E-16

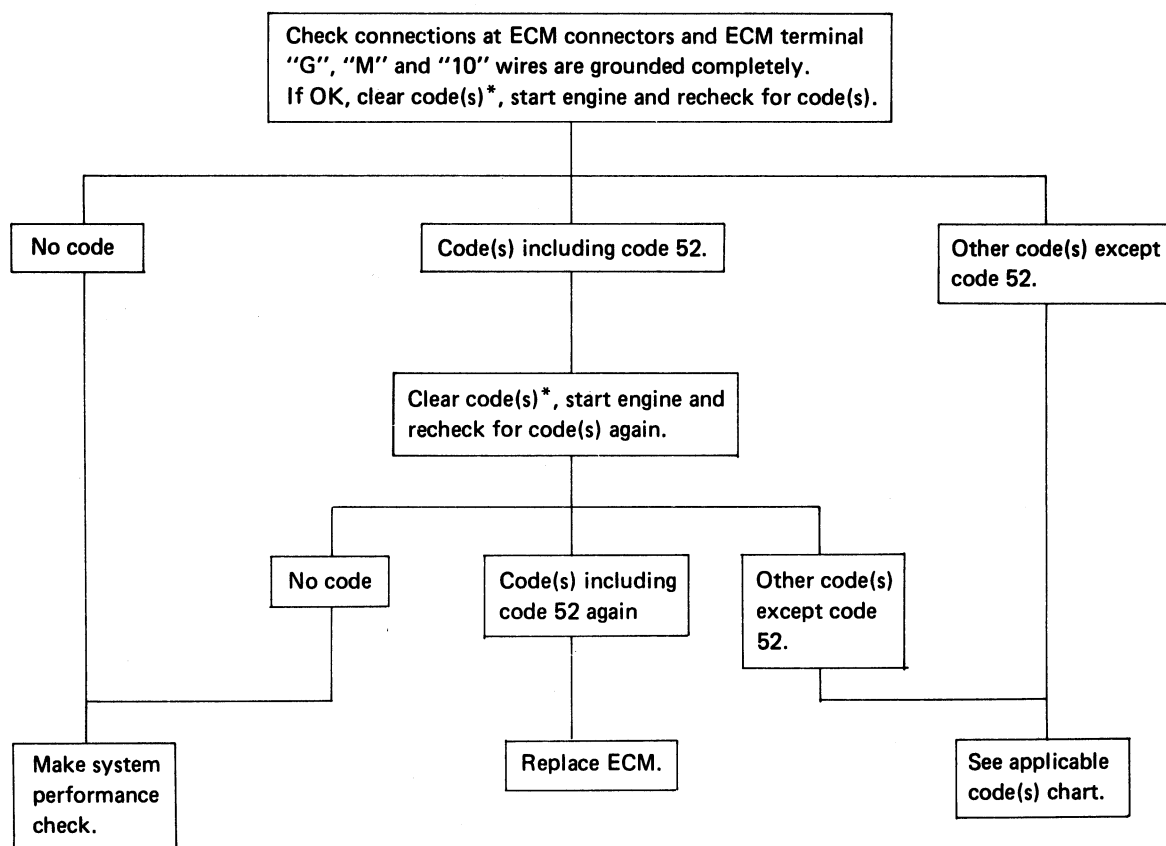
TROUBLE CODE 51

CONSTANT HIGH VOLTAGE FROM FUEL CUT (F/C) SOLENOID TO ECM



* See Code(s) Clearing Procedure (Fig. E-A)

Fig. E-17

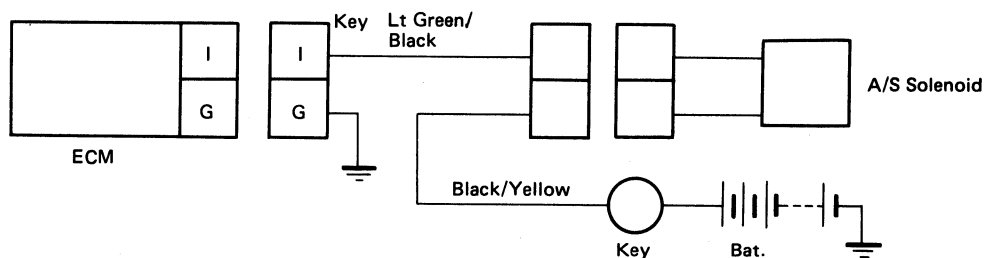
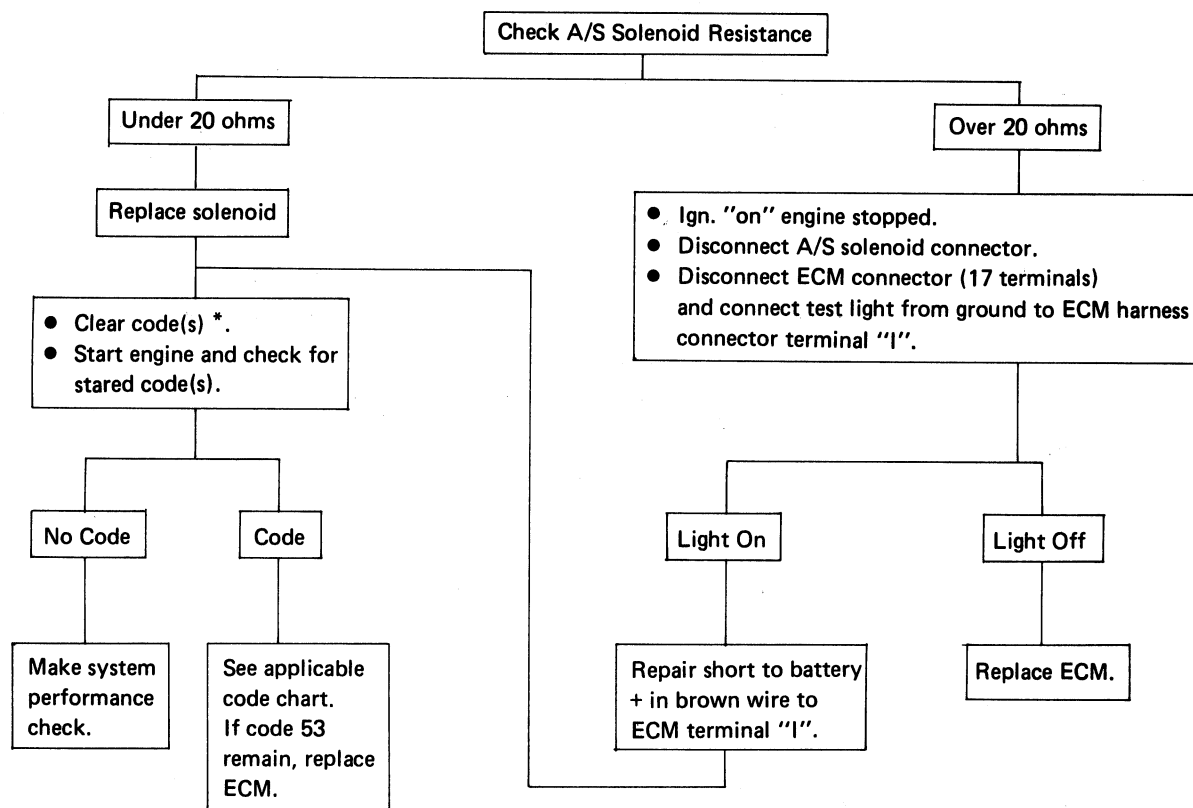
**TROUBLE CODE 52
RAM PROBLEM**

* See Code(s) Clearing Procedure. (Fig. E-A)

Fig. E-18

TROUBLE CODE 53

CONSTANT HIGH VOLTAGE FROM AIR SWITCHING (A/S) SOLENOID TO ECM

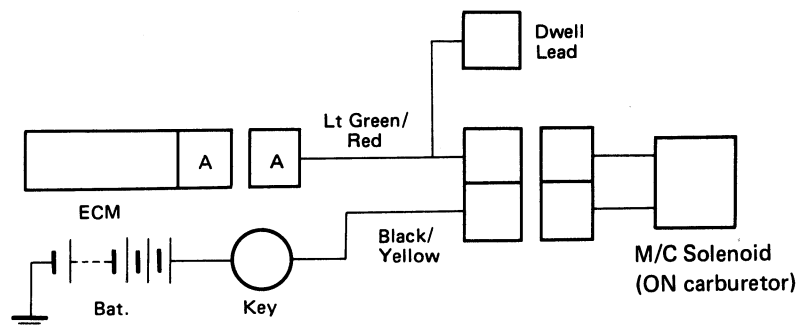
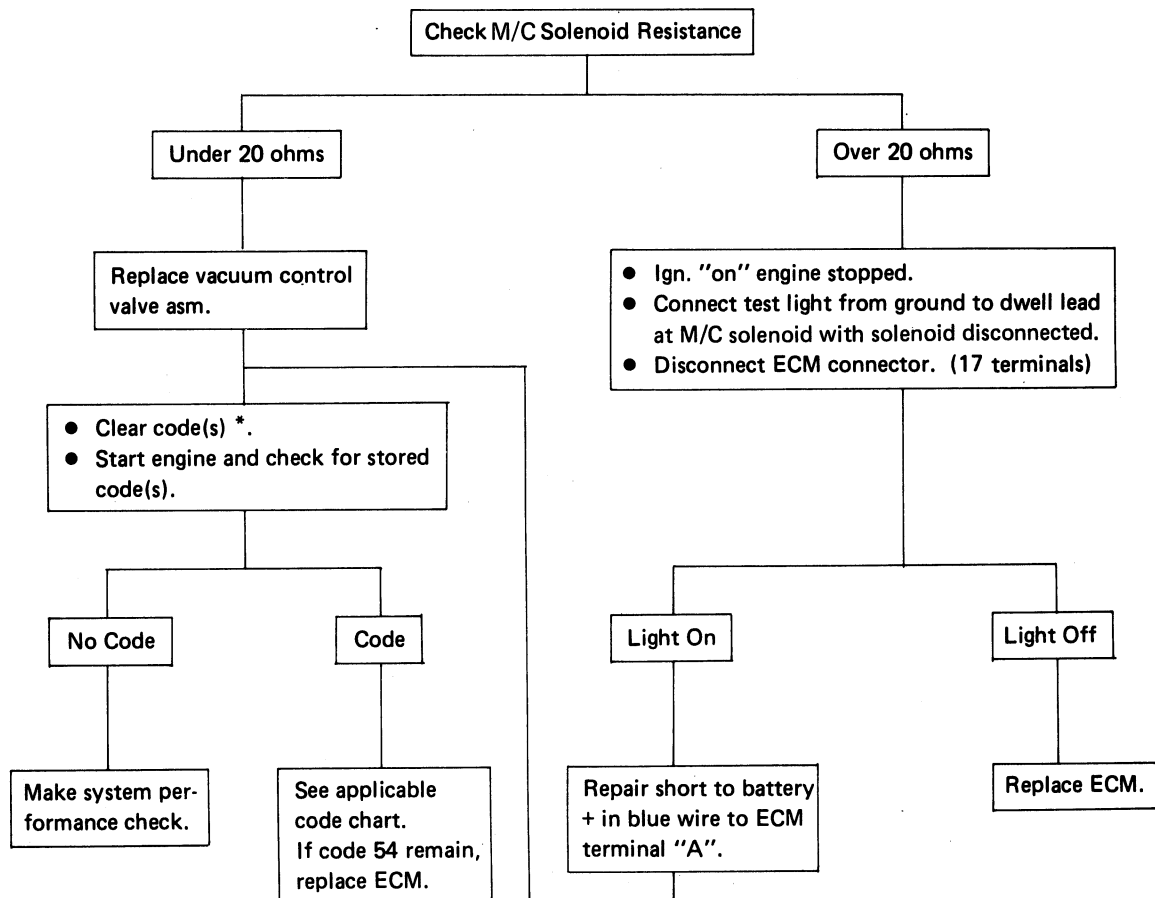


* See Code(s) Clearing Procedure. (Fig. E-A)

Fig. E-19

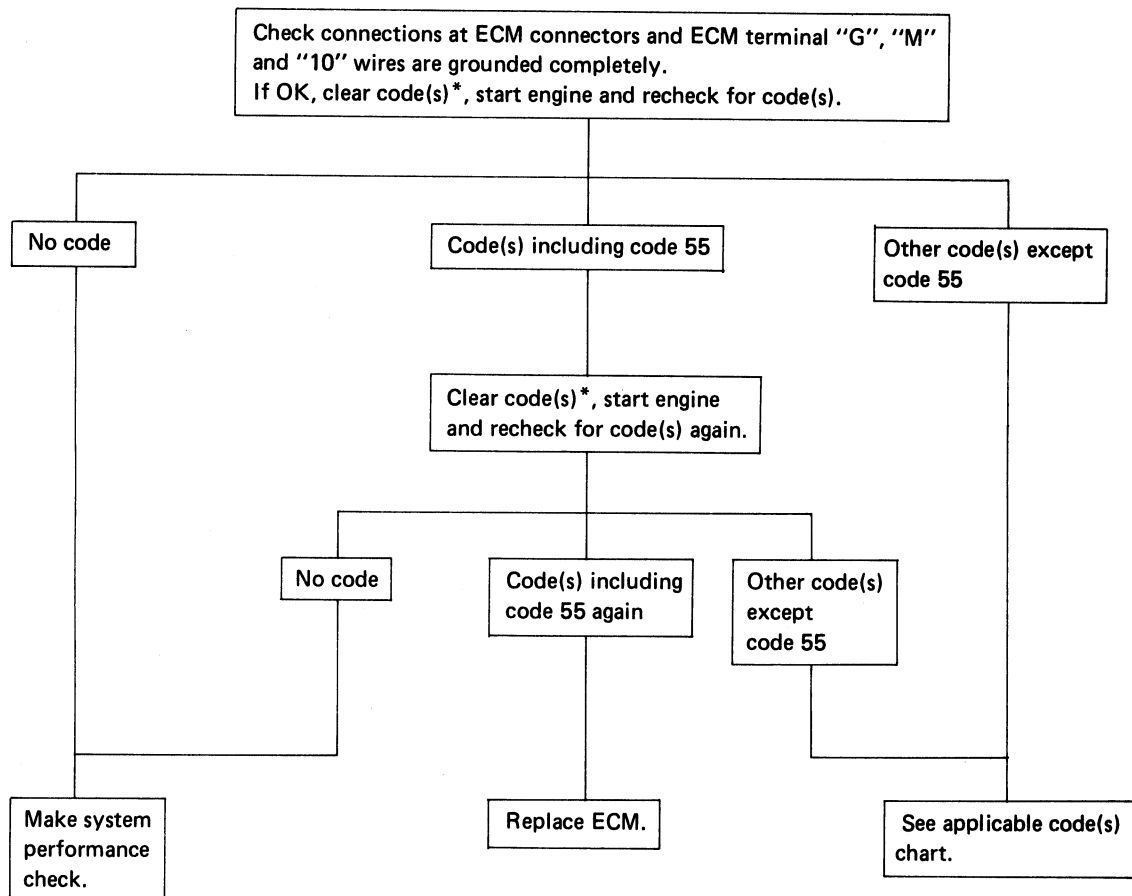
TROUBLE CODE 54

CONSTANT HIGH VOLTAGE FROM CARBURETOR MIXTURE CONTROL (M/C) SOLENOID TO ECM



* See Code(s) Clearing Procedure. (Fig. E-A)

Fig. E-20

TROUBLE CODE 55
A/D CONVERTER PROBLEM

* See Code(s) Clearing Procedure. (Fig. E-A)

Fig. E-21

AIR MANAGEMENT CHECK

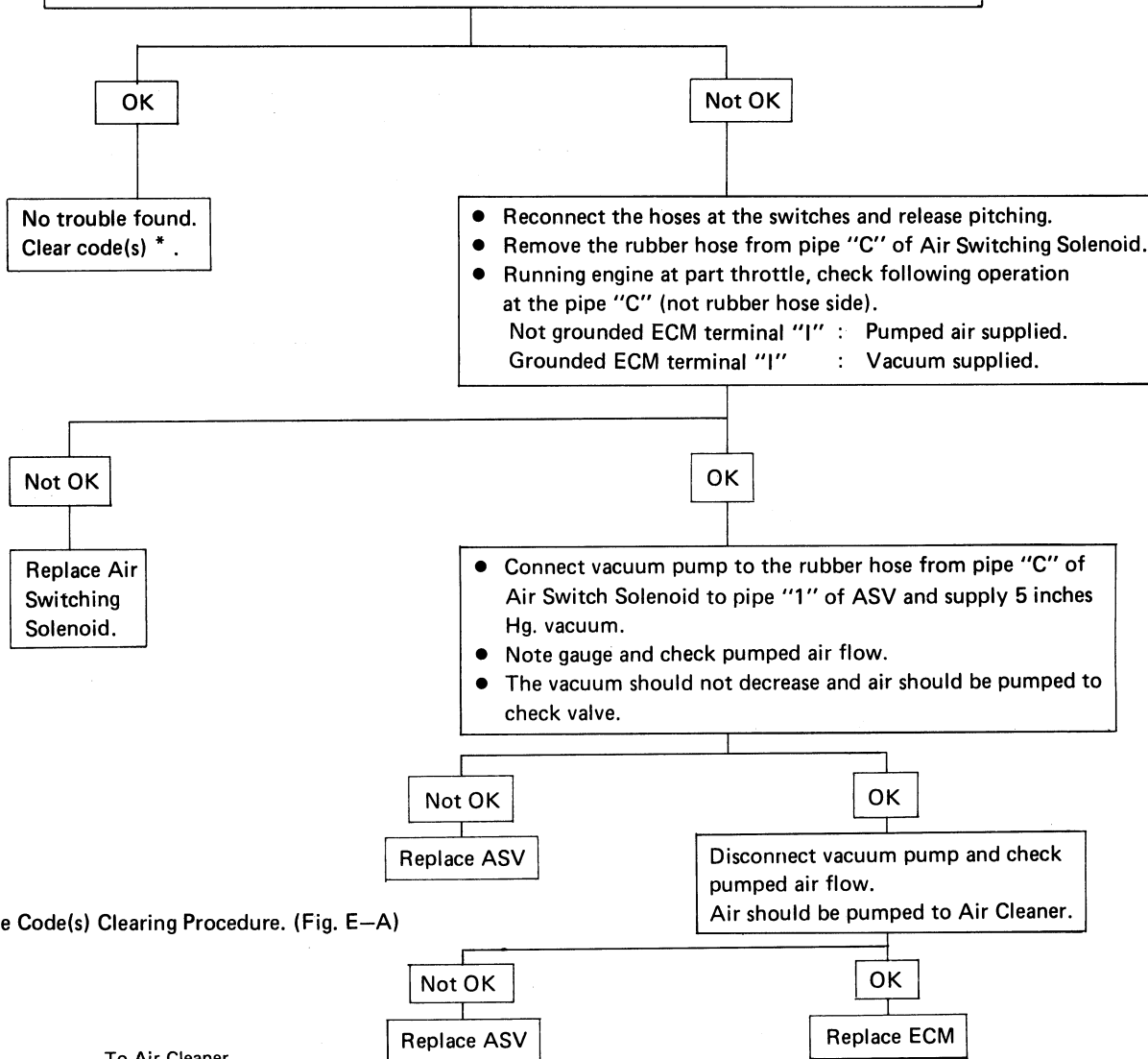
Check vacuum hose routing and connection for AIR System. Correct or repair as necessary.

- Warm up engine until upper radiator hose becomes warm.
- Disconnect rubber hoses to Check Valve and Air Cleaner from Air Switching Valve (ASV).
- Running the engine at part throttle, check the following operation.

Air should divert to Air Cleaner.

Pinching rubber hoses at Idle and WOT switches, disconnect them.

From the moment, air should be pumped to Check Valve for about 10 seconds and then switched to Air Cleaner.



* See Code(s) Clearing Procedure. (Fig. E-A)

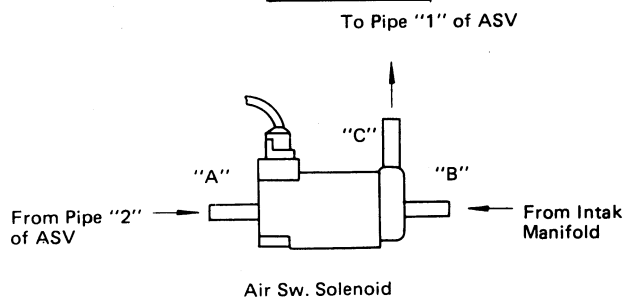
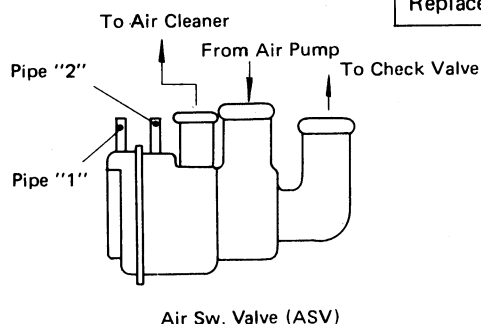


Fig. E-22

IDLE AND WOT SWITCHES ASSEMBLY CHECK

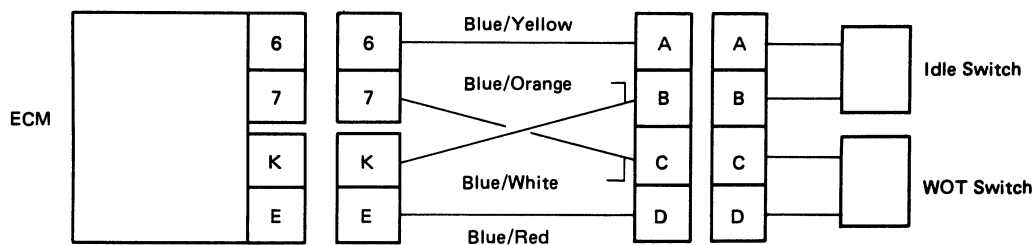
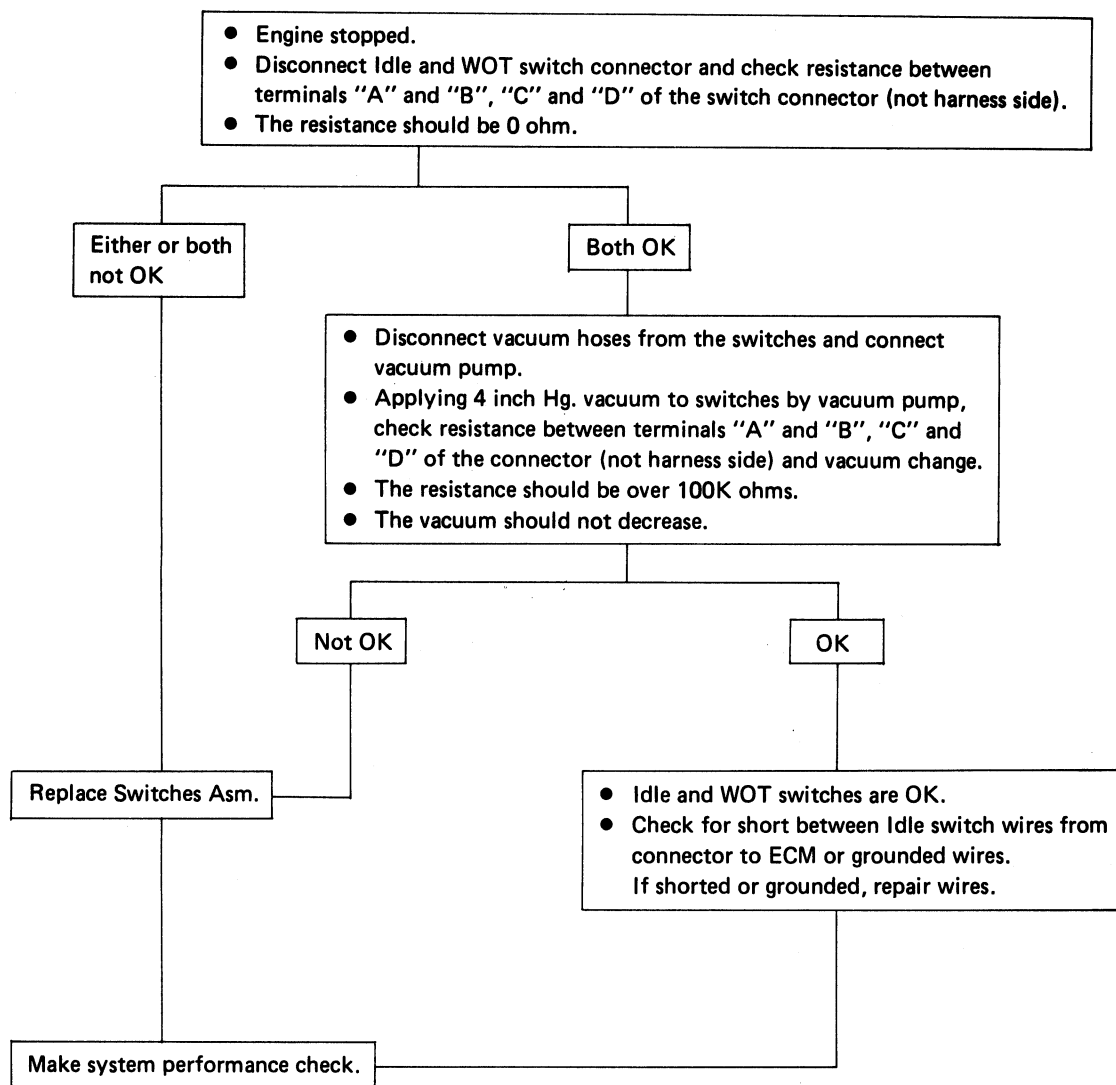


Fig. E-23

CARBURETOR MIXTURE CONTROL (M/C) SOLENOID CHECK

- . Disconnect oxygen sensor connector and vacuum switch connector.
- . Ignition "on", engine stopped.
- . Check repeated clicks from M/C solenoid.

No repeated clicks

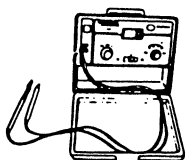
Replace M/C
solenoid.

Repeated clicks

See carburetor
check procedure.

Fig. E-24

TOOLS AND EQUIPMENT



DIGITAL
VOLT/OHMMETER
(10 MEGOHM
INPUT IMPEDANCE,
MINIMUM)



TEST LIGHT



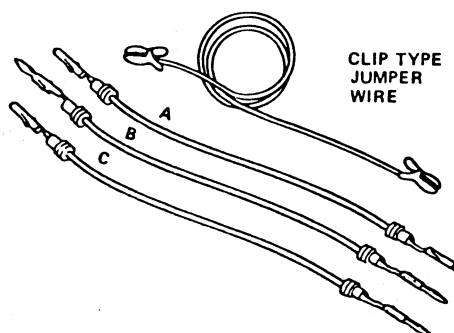
DWELL
TACHOMETER

(IF ENGINE PERFORMANCE
CHANGES WHEN DWELL METER
IS CONNECTED, IT CANNOT BE
USED FOR DIAGNOSIS.)



VACUUM PUMP
(20 IN. HG.
MINIMUM)

JUMPER
WIRES—APPROX. 6" LONG:
A 1- FEMALE BOTH ENDS
B 2- MALE BOTH ENDS
C 4- MALE-FEMALE
ON OPPOSITE ENDS
(TERMINAL NOS.
12014836 AND 12014837.
MAKE JUMPERS UP WITH
#16, 18 OR 20 WIRE.)



CLIP TYPE
JUMPER
WIRE

The Closed Loop Emission Control system requires the following tools and equipment to properly diagnose the complete system:

System performance checking

- Tachometer — Either a crankshaft harmonic balance revolution pickup type or an electronic coil trigger signal pickup type tachometer can be used for diagnosis.
- Dwellmeter — Used to indicate the performance conditions of the vacuum control solenoid circuit. Connect the positive lead of dwellmeter to the bright green connector in the Closed Loop Emission Control wiring harness and the negative lead to ground. Place the meter on the 4-cylinder scale. The scale on the meter will show the condition of the circuit. When the needle is on the 10°, a rich mixture is indicated. A lean mixture will read near 54° scale. A varying needle indicates that the system is in closed loop. Although most dwell meters will work. If one causes a change in engine operation when connected to the "dwell" lead, it cannot be used.
- Vacuum Gage — to monitor manifold engine vacuum.
- Vacuum Pump — to check pressure or vacuum sensors and vacuum operated valves.

Circuit Checking

- Voltmeter and Ohmmeter — use digital volt-ohmmeter J-29125-A to measure voltage and ohms for Closed Loop Emission Control circuits.
- Jumper Wires — to by-pass a circuit and to insert between special connectors to permit access to the connector terminals for circuit access to the connector terminals for circuit checking.
- Test light

SECTION 04

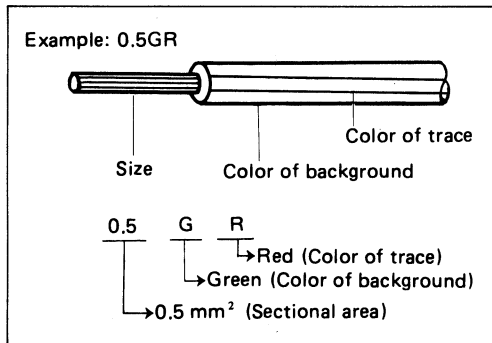
ELECTRICALS

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GENERAL INFORMATION

CODING OF WIRES IN WIRING DIAGRAM



The codes used in the wiring diagram represent the thickness of wires and color of insulator.

Example : 0.5 GR

0.5 Thickness of wire (in cross-sectional area)
 G Background color of vinyl insulator (green)
 R Color of trace (red)

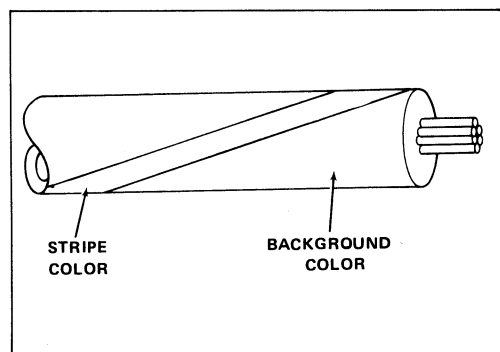
LOW VOLTAGE CABLES

All chassis low voltage cables are vinyl insulated. The vinyl insulators are color-coded for easy identification of individual chassis circuits. The types of low voltage cables used in the vehicle are shown in the following chart.

The size of the wire is indicated in terms of nominal cross-sectional area which is also represented as 00 square. The values in the tables are reference values based on the environment temperature of 20°C (68°F) as the maximum allowable current for a cable varies depending on its length, heat dissipation properties, and length of time current is applied.

Size of Cable mm ² (Awg)	Number of wires/ Wire diameter. mm(in.)	Resistance at normal room temperature of 20°C(68°F) Ω/m(Ω/ft.)	Maximum allowable Current A
0.5 (20)	7/0.32 (0.013)	0.03250 (0.00991)	11.3
0.85 (18)	11/0.32 (0.013)	0.02050 (0.00625)	14.8
1.25 (16)	16/0.32 (0.013)	0.01410 (0.00430)	18.8
2 (14)	26/0.32 (0.013)	0.00867 (0.00264)	25.4
3 (12)	41/0.32 (0.013)	0.00550 (0.00168)	34.2
5 (10)	65/0.32 (0.013)	0.00347 (0.00106)	45.9
8 (8)	50/0.45 (0.018)	0.00228 (0.00070)	59.8
15 (6)	84/0.45 (0.018)	0.00136 (0.00042)	82.8
20 (4)	41/0.80 (0.031)	0.00087 (0.00027)	110.9
30 (2)	70/0.80 (0.031)	0.00051 (0.00016)	

COLOR CODES

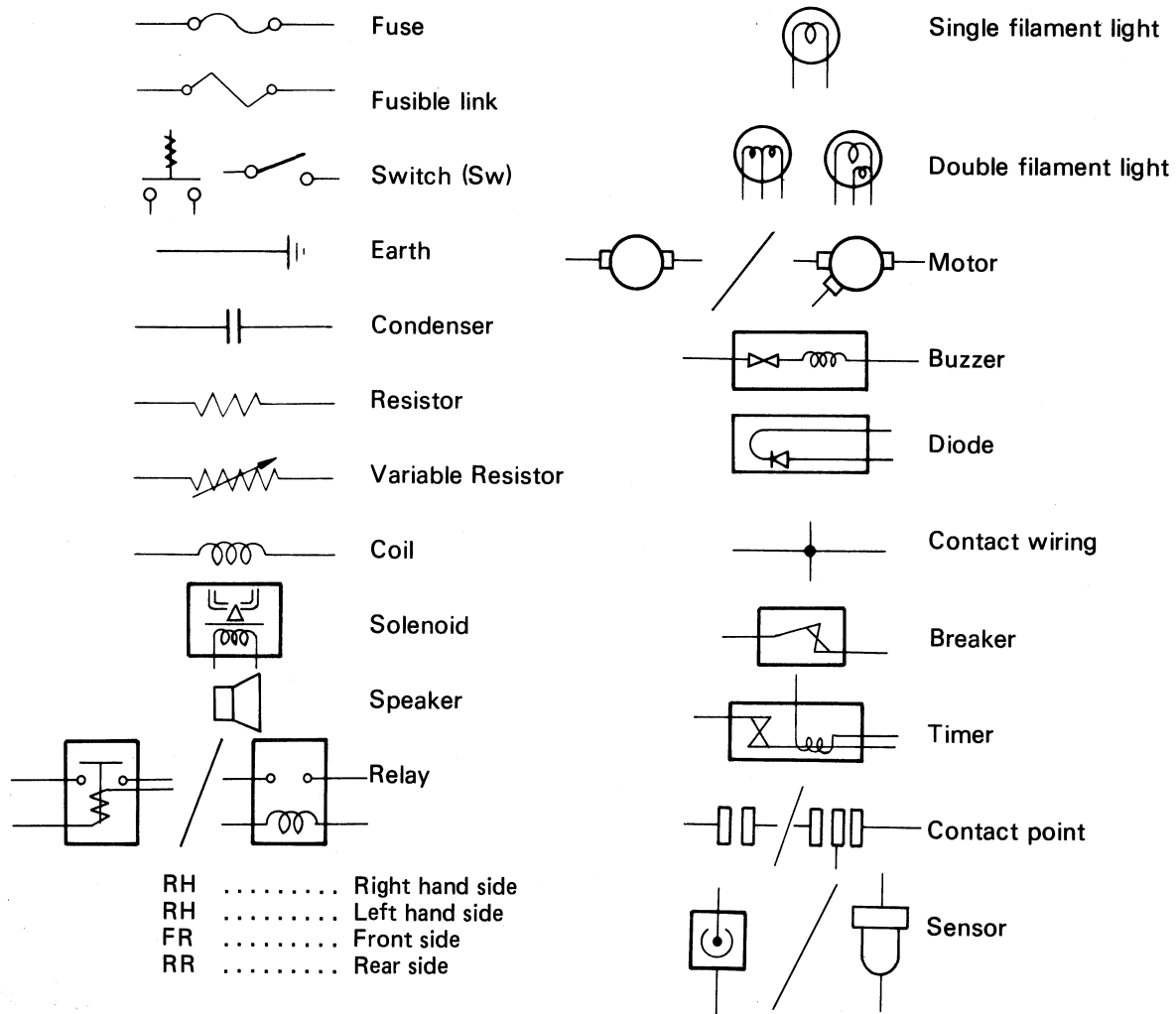


Each circuit is wired by using different color cables for easy identification. The color of cable in each circuit is as shown in the cable color table below. The first letter in the color symbol represents the color while the second letter denotes the color of the spiral stripe on the cable.

CABLE COLOR TABLE

Classification Circuit in use	Vinyl-insulated wires					
Starting motor circuit	Black (B)	Black-White (BW)	Black-Yellow (BY)	Black-Red (BR)	Black-Green (BG)	
Charging circuit	White (W)	White-Red (WR)	White-Black (WB)	White-Blue (WL)	White-Yellow (WY)	White-Green (WG)
Light circuit	Red (R)	Red-White (RW)	Red-Black (RB)	Red-Yellow (RY)	Red-Green (RG)	Red-Blue (RL)
Signal circuit	Green (G)	Green-White (GW)	Green-Red (GR)	Green-Yellow (GY)	Green-Black (GB)	Green-Blue (GL)
Instrument circuit	Yellow (Y)	Yellow-Red (YR)	Yellow-Black (YB)	Yellow-Green (YG)	Yellow-Blue (YL)	Yellow-White (YW)
Wiper circuit	Blue (L)	Blue-White (LW)	Blue-Red (LR)	Blue-Black (LB)		
Others	Light-Green (Lg)	Brown-White (BrW)				

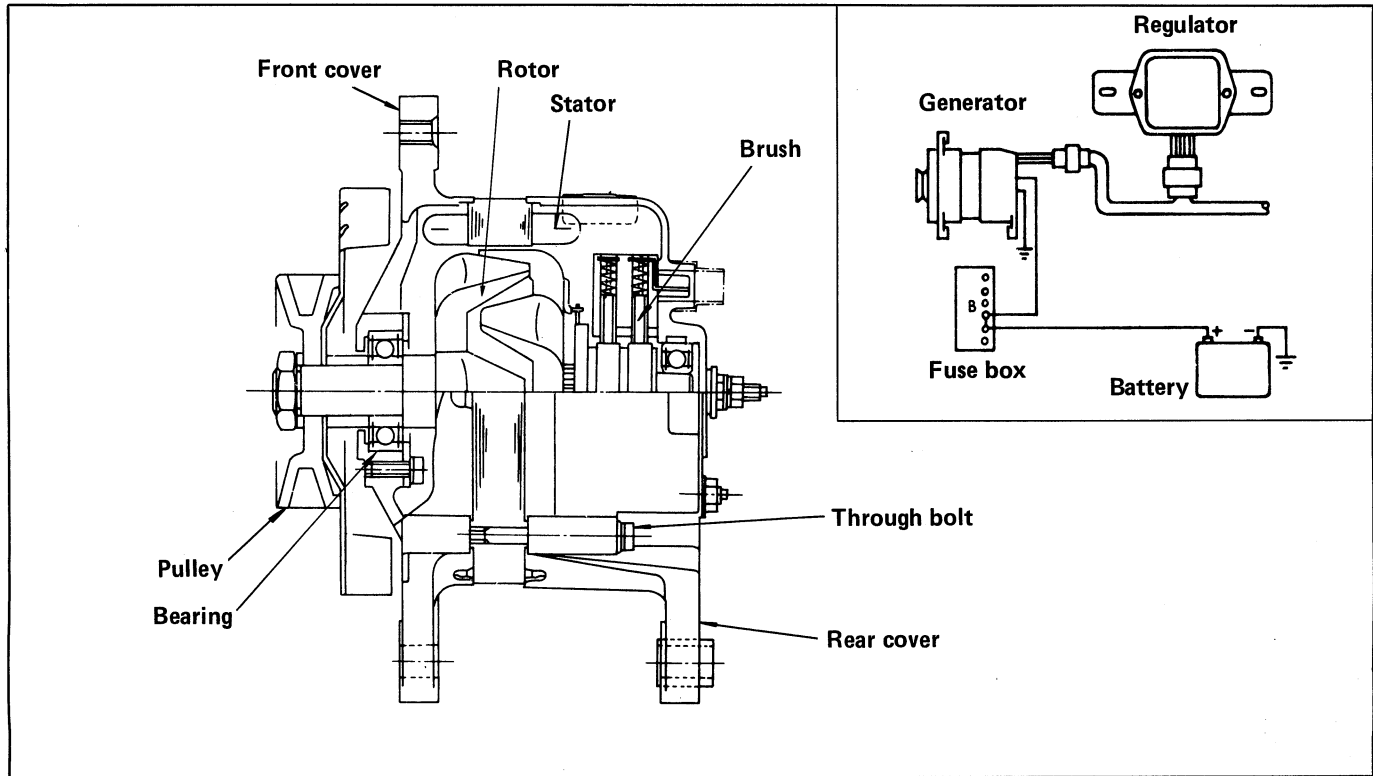
SYMBOLS AND ABBREVIATIONS USED IN WIRING DIAGRAMS



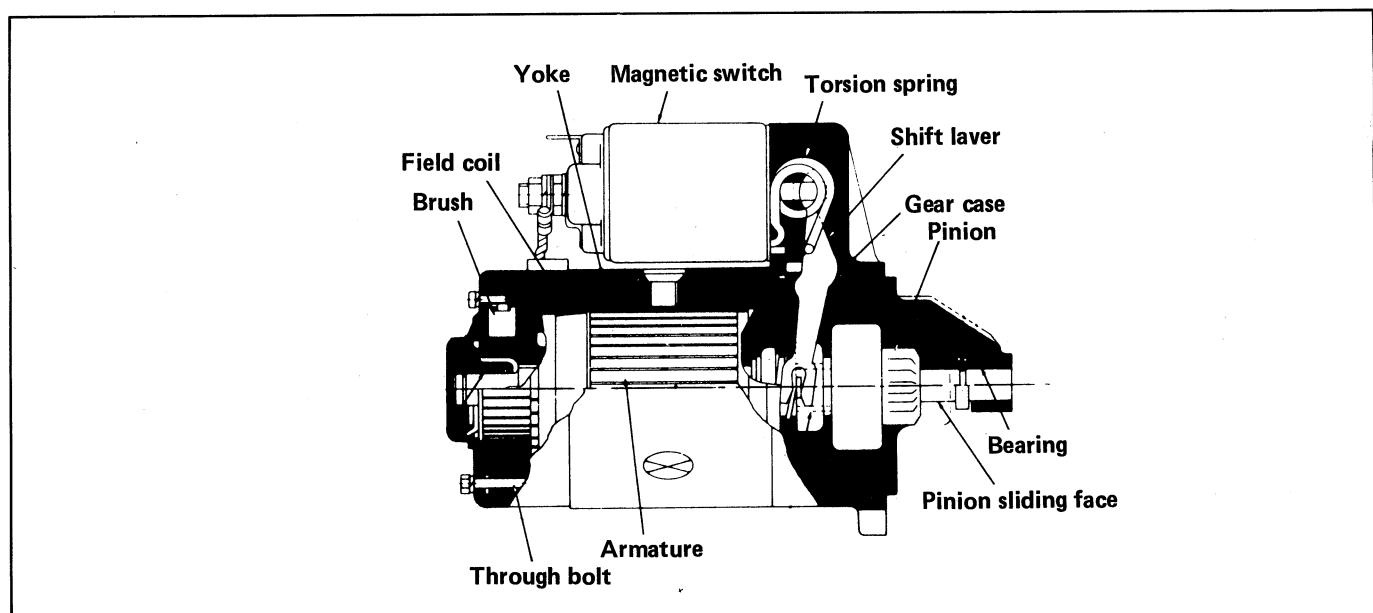
ENGINE ELECTRICALS

GENERAL DESCRIPTION

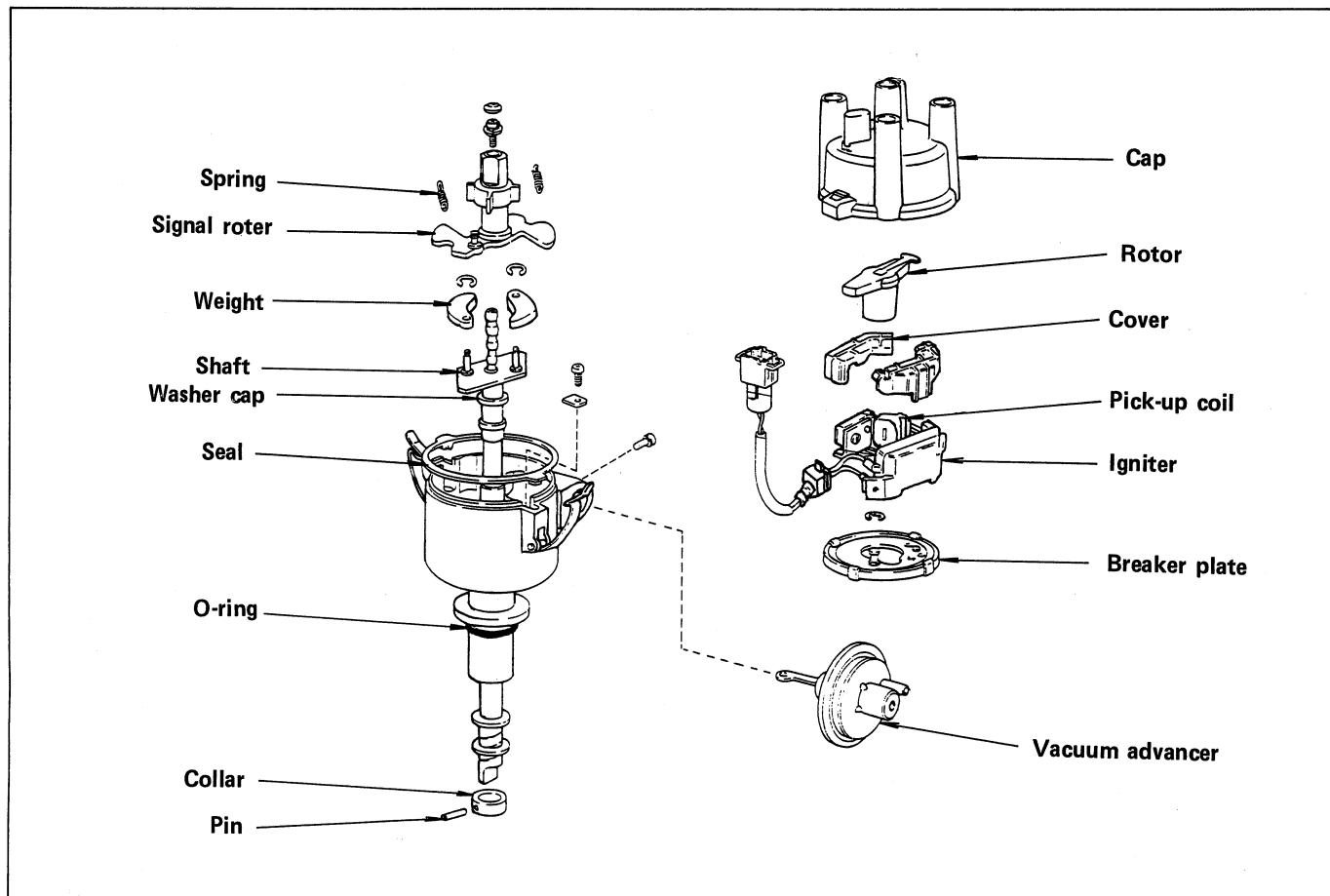
GENERATOR



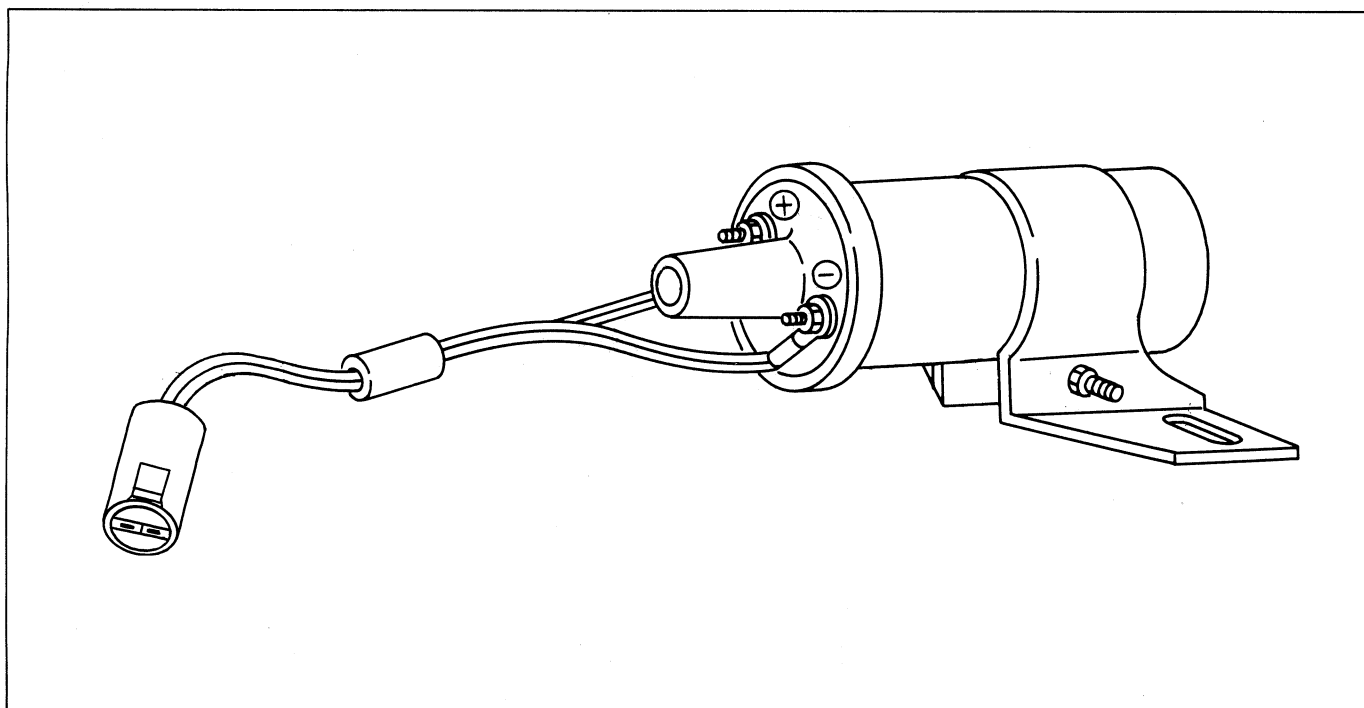
STARTER MOTOR



DISTRIBUTOR



IGNITION COIL



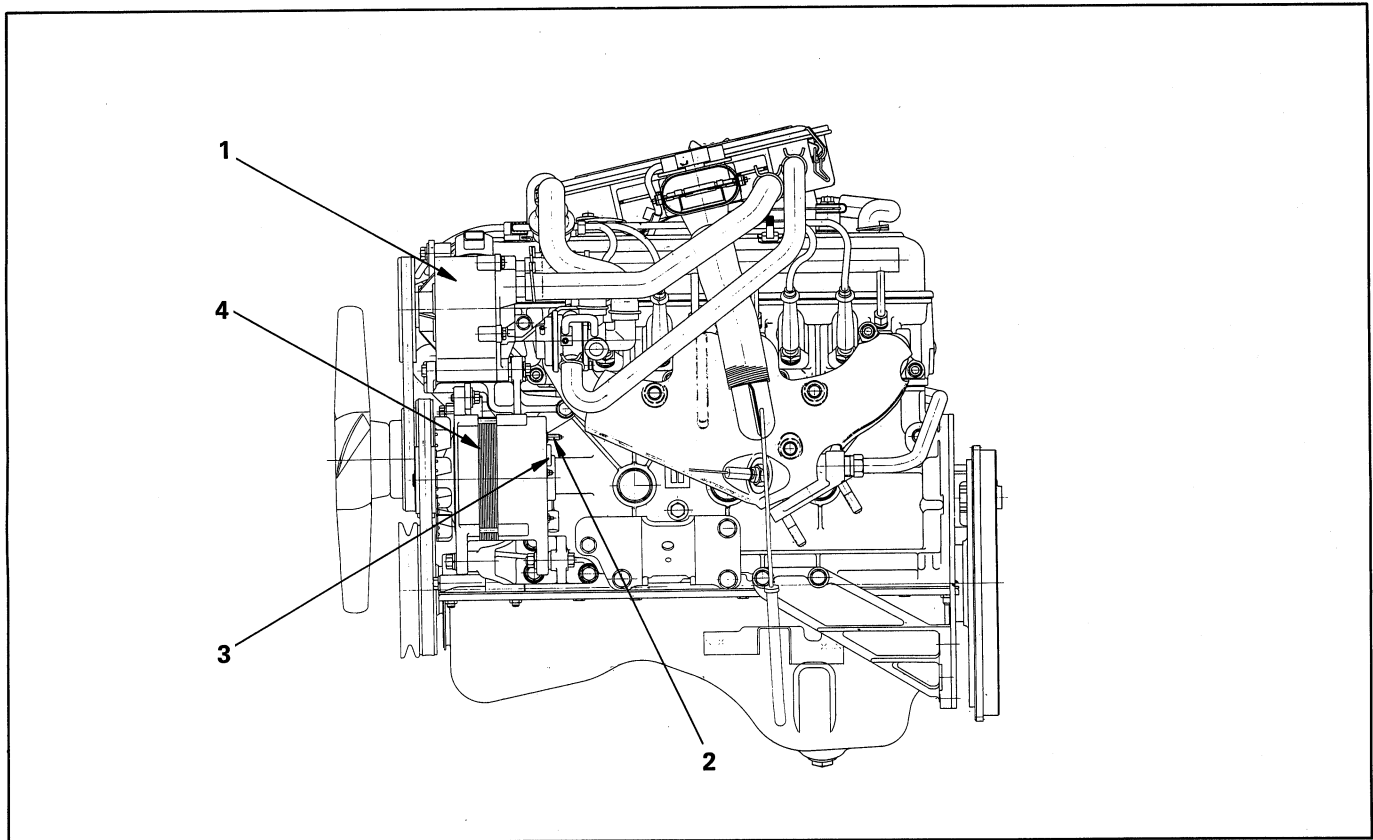
MAIN DATA AND SPECIFICATIONS

STARTER MOTOR		
Type		Solenoid-controlled with over-running clutch
Rated voltage	(V)	12
Rated out-put	(kW)	1.2
Terminal voltage — with load	(V)	9.15
Load current	(A)	200
Torque with load	(m-kG/ft.lbs.)	0.47/3.4 min.
No. of revolution — with load	(rpm)	2,000
GENERATOR		
Type		Stator diode rectified
Voltage	(V)	12
Drive & rotation		V-belt, clockwise viewed from front
Ground polarity		Negative
Max. out-put		
Amp	(Amp)	50
Alternator	(rpm)	5000
Speed ratio to — Engine	(to 1)	1.96
Max. speed	(rpm)	13500
REGULATOR		
Type		Tirill
DISTRIBUTOR		
Type		Full transistorized
Model		100291 — 0141
Ignition interval		89.2° to 90.8°
Direction of rotation		Counter-clockwise
SPARK PLUG		
Model		BPR6ES11
Size	(mm)	M14, P = 1.25
Spark gap	(mm/in.)	1.05 (0.04)

GENERATOR



REMOVAL AND INSTALLATION



Removal steps

Before removal, disconnect faulty ground cable

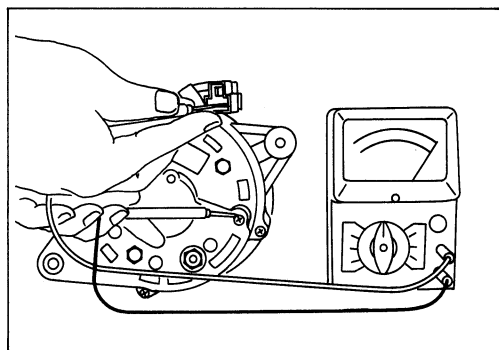
1. Air pump
2. A terminal ; generator
3. Connector ; generator
4. Generator assembly

Installation steps

To install, follow the removal steps in reverse order.



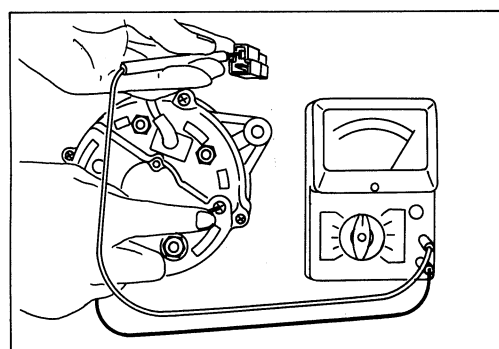
INSPECTION (Before disassembly)



• Rotor coil resistance test

Measure the resistance across the F and E terminals (rotor coil resistance).

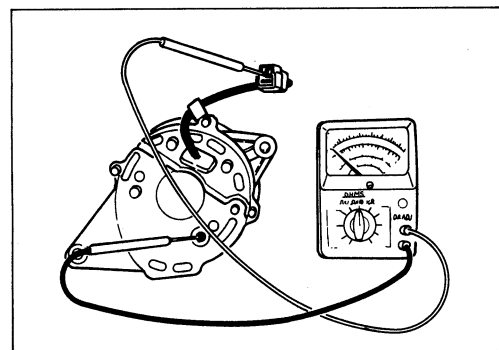
1. The rotor coil circuit is normal if resistance measured across the terminals is 5 ohms.
2. If resistance is higher than 5 ohms, there is poor contact between the brushes and the commutator.
3. If no continuity exists between the F and E terminals, the problem is an open rotor coil circuit, a brush sticking, or a broken lead wire.
4. If the resistance is lower than 5 ohms, it may be an indication of a rotor coil layer short or of the circuit being grounded.



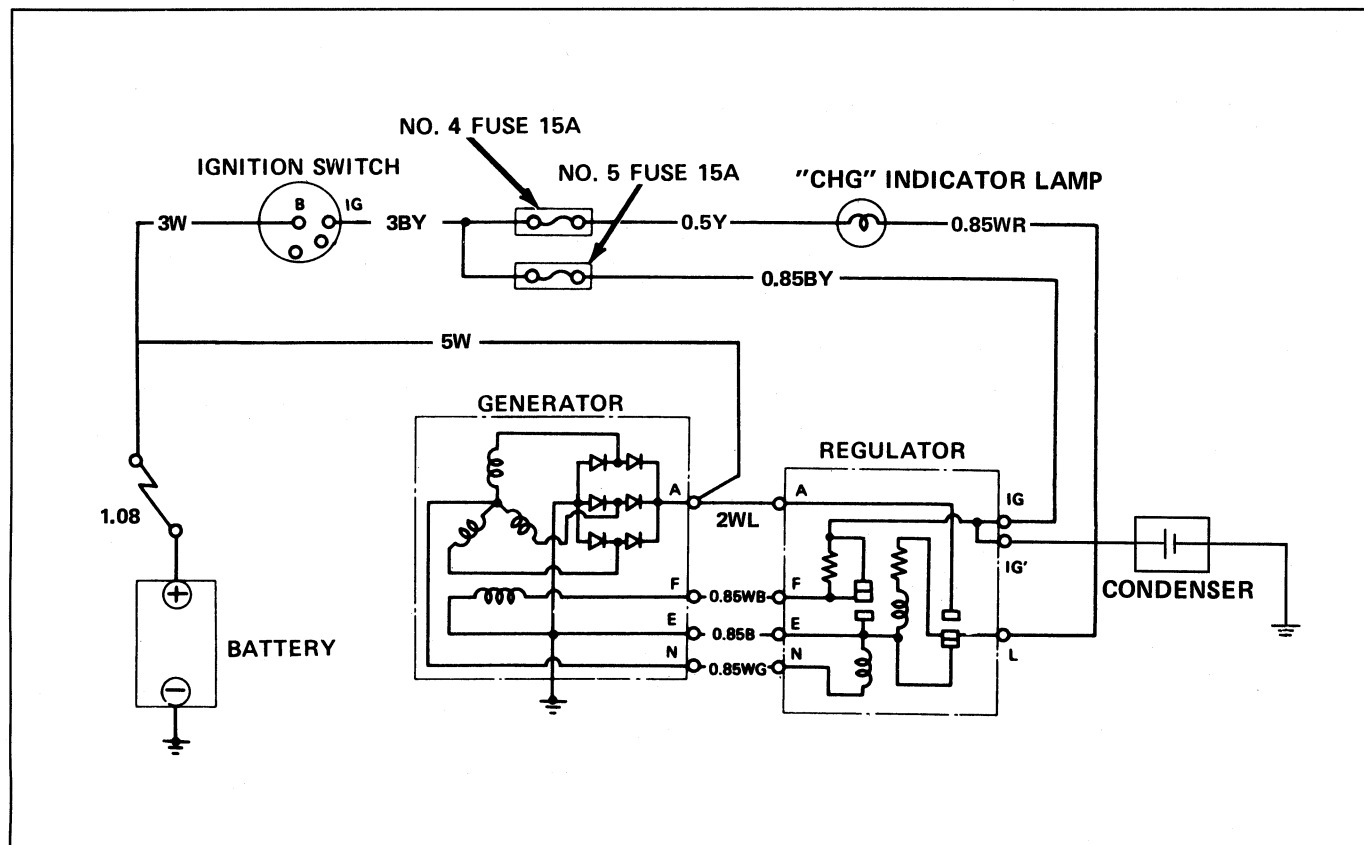
• Positive discle test

Test the rectifying diodes in the following manner. This test method will not detect an open state of the diodes. The tester will indicate a continuity regardless of the condition of the diodes, when the tester leads are connected to the terminals with polarities reversed.

- a. Connect the positive (+) lead of tester to the generator N terminal and the tester negative (-) lead to the generator A terminal. If there is continuity between the terminals, it indicates that one or more of the three diodes in the positive side are shorted.
- b. Similarly, connect the tester positive (+) lead to the generator E terminal and the tester negative (-) lead to the generator N terminal. If there is continuity, it indicates that one or more of the three diodes in the negative side (-) are shorted.

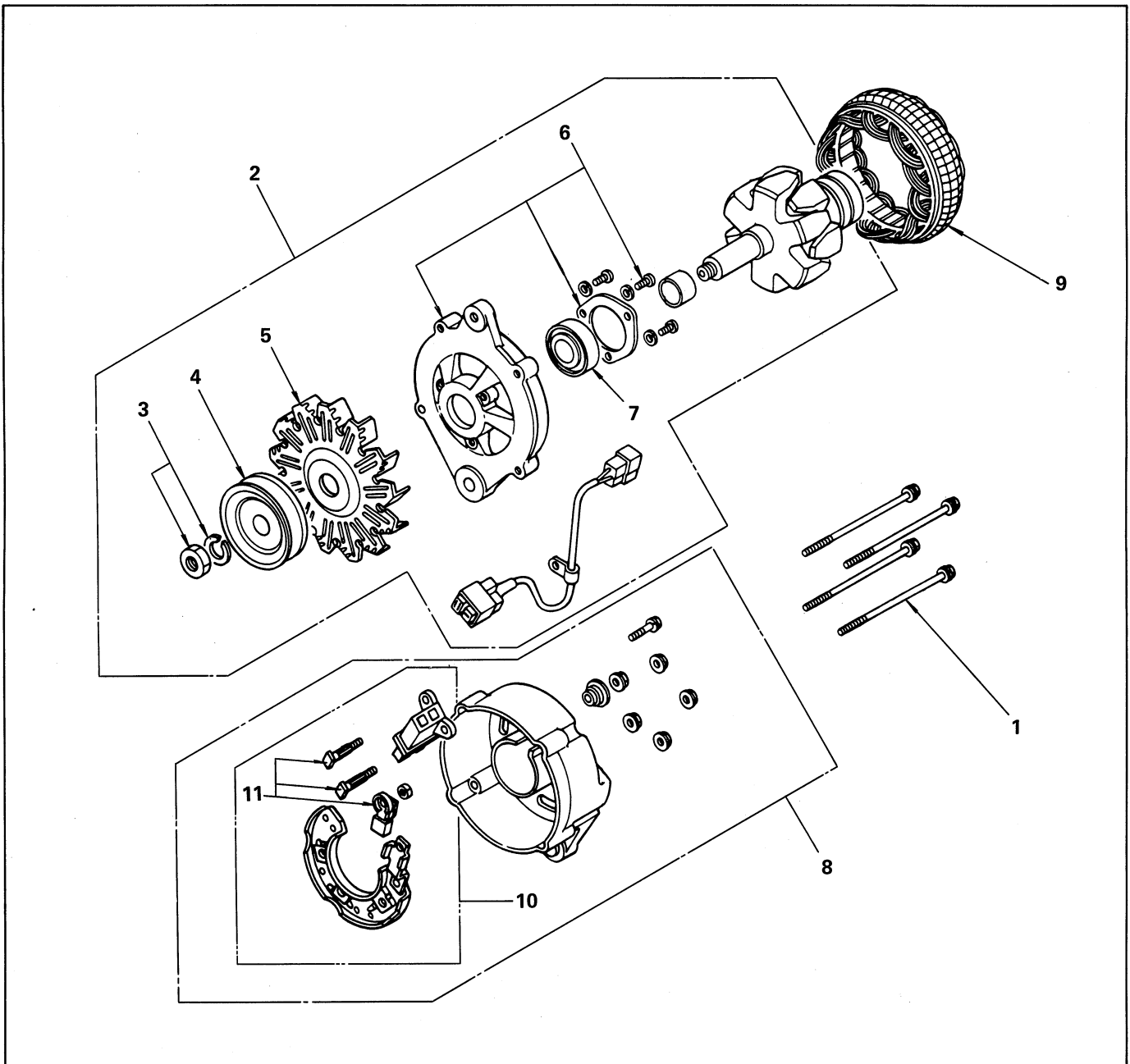


CHARGING CIRCUIT





DISASSEMBLY AND REASSEMBLY

**Disassembly steps**

1. Bolts
- ▲ 2. Front cover assembly (with rotor assembly)
3. Nut
4. Pulley
5. Fan
- ▲ 6. Cover assembly
7. Front bearing
- ▲ 8. Rear carrier and stator assembly
- ▲ 9. Stator assembly
- ▲ 10. Brush assembly and diode assembly
11. Brush and condenser assembly

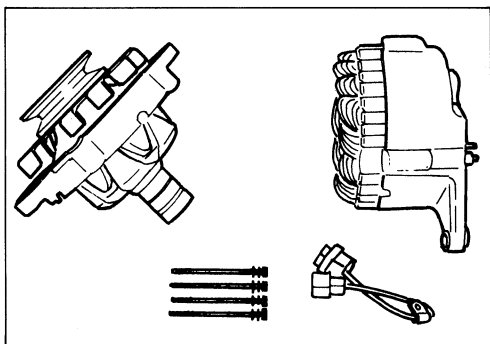
Reassembly steps

To reassemble, follow the disassembly procedure in reverse order.



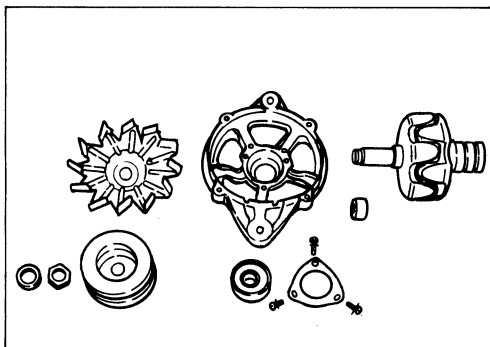
Important operation — Disassembly

2. Front cover assembly (with rotor assembly)

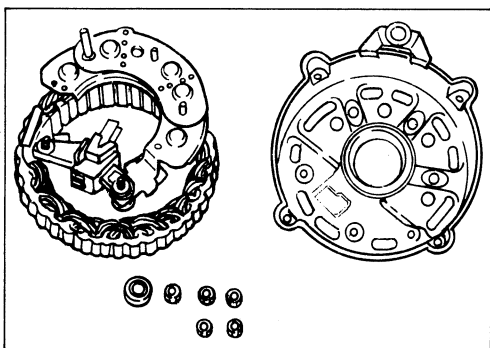


6. Cover assembly

Clamp the rotor in a vise when removing the nut.

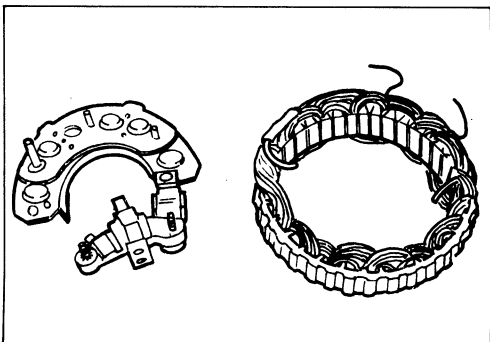


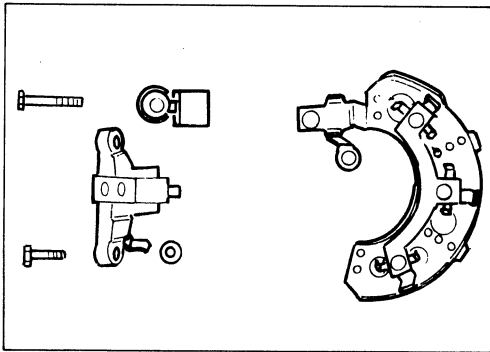
8. Rear carrier and stator assembly



9. Stator assembly

Disconnect the diode to stator coil connections (soldered), then separate the diodes from the stator together with the brush and capacitor.

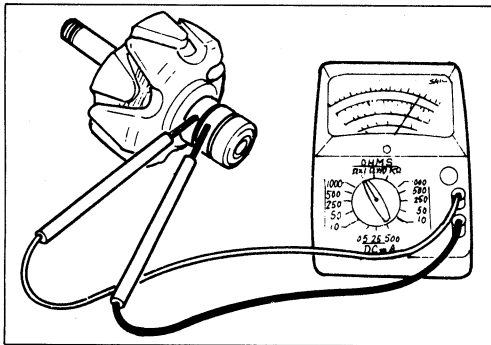




10. Brush assembly and diode assembly

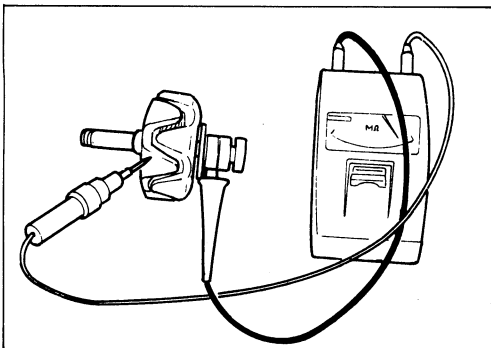


INSPECTION (Component)

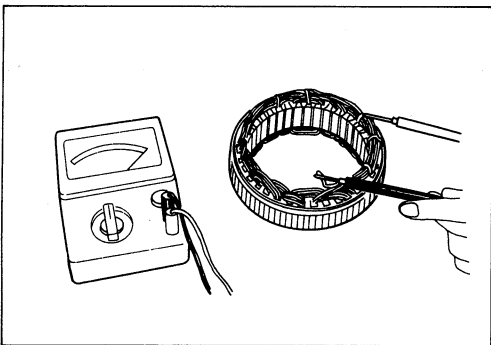


Rotor

1. Check the rotor for an open circuit by measuring the resistance between the slip rings. The rotor coil is normal if resistance is approximately 4 ohms.

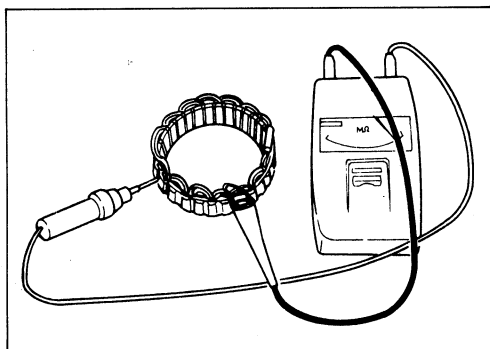


2. With a 500 volt multimeter, check the resistance between the rotor core and the positive (+) side slip ring. Standard resistance is 1 megohm or above.

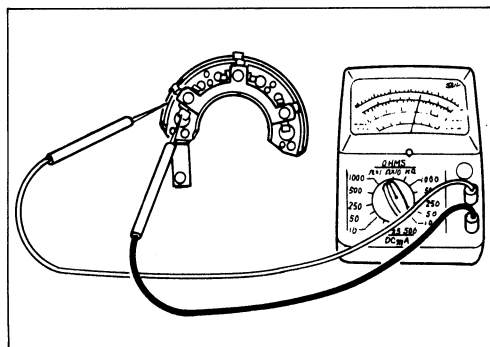


Stator coils

1. Make a continuity test across the stator coil. If no continuity exists there is an open coil circuit.

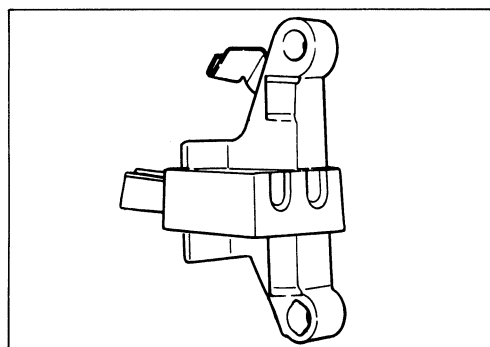
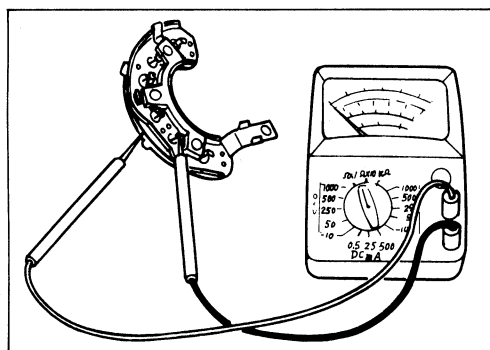


2. Check the resistance between the stator coils and the core using a megger meter. Standard resistance is 1 megohm or above.



Diodes

1. Measure the resistance between each diode terminal and holder in forward and reverse directions with the connection of the tester leads switched. The diodes are normal if resistance is nearly zero ohms in one direction and is infinitely high in the other direction.
2. If a diode has no resistance or equal resistance in both directions, it is defective and should be replaced together with the holder.



Brush and brush holder

1. Inspect the brush for damage, broken leads or wear. Replace the brush holder assembly if wear has reached the limit line on the brush.
2. Check the movement of the brush within the brush holder. Replace the brush holder assembly if it is defective.

Bearings

Inspect and replace any bearing which makes noise or has play. Check and replace the front and the rear covers if bearing fit in the hole is loose.

**Important operation — Reassembly****NOTICE:**

1. NEVER make battery connections with polarities reversed, or battery will be shorted via the diodes.
This will cause damage to the diodes.
 2. Do not connect generator A terminal to ground because it is connected directly to the battery. This cable will burn if connected to ground by error.
 3. Make sure to disconnect positive (+) terminal of battery when quick-charging battery or diodes may be damaged due to abnormal pulse voltage generated by the quick charger.
 4. Keep diodes away from water.
-
1. Reassemble generator parts in reverse order of disassembly.

**NOTICE:**

When reassembling the front section to the rear side, insert a tough wire into hole in the rear face of the rear cover from the outboard side to support the brush in raised position, then insert the front section to which rotor is assembled.

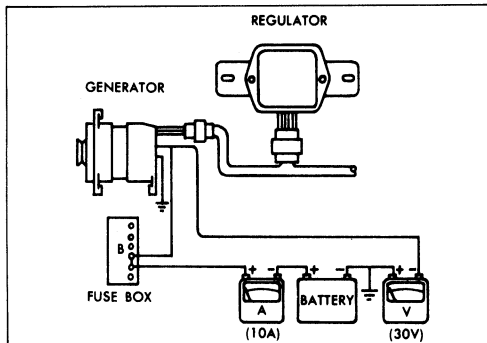
When installing the front section, exercise care so as not to scratch the face of the brush in contact with the wire.

2. Reassemble parts carefully to be sure they are fitted into their original position, paying attention to the insulated portions.
3. Wipe insulating tubes, washers and plates clean and install them in position carefully, to avoid getting oil or grease on them.



REGULATOR

OPERATING TEST

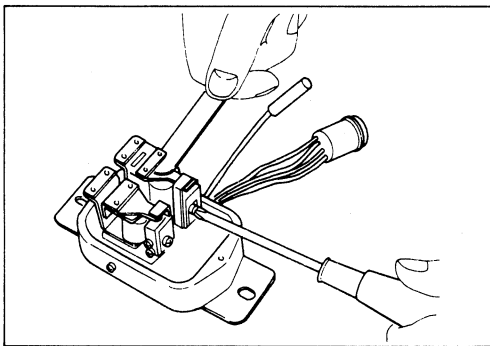


Test the regulator while it is cold. Never test if immediately after driving.

1. Connect the voltmeter and the ammeter.
2. Start and maintain engine speed at 2500 rpm for a few minutes, then check to make sure that reading of ammeter is 5 amperes or less. If the ammeter reading remains higher than 5 amperes, disconnect the battery in use and connect a battery known to be fully charged. Recheck to be sure the reading of the ammeter is lower than 5 amperes.
3. Lower engine speed to idle and again increase it gradually to 2500 rpm and note the voltmeter reading. The function of the regulator is normal if the measured value is within 13.8 to 14.8 volts. If the reading of the voltmeter deviates from the specified range. The regulator is in need of adjustment. Regulator setting should not be disturbed as it is guaranteed by the manufacturer.

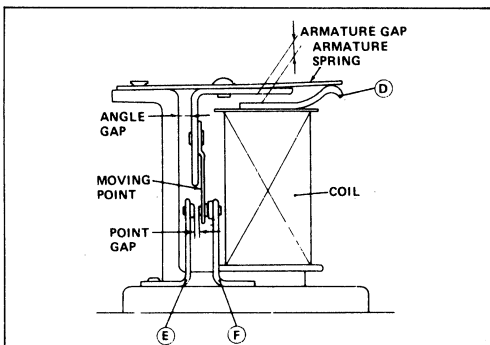


INSPECTION



Disconnect the voltage regulator wiring prior to any adjustments or the battery circuit may be shorted. Remove regulator cover.

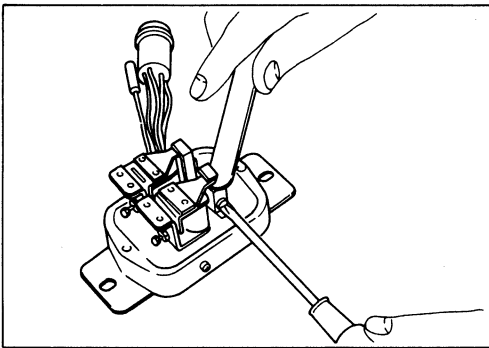
1. If the contact points are roughened, dress them with fine sand paper (#500 to 600).
2. Check and adjust the gaps in sequence of core gap and point gap. Adjustment of the yoke gap is unnecessary.
3. Adjust the core gap by loosening the 4 mm (0.16 in.) screws attaching the contact set to the yoke. Move the contact set up or down as required. Standard core gap is 0.6 to 1.0 mm (0.024 to 0.039 in.)



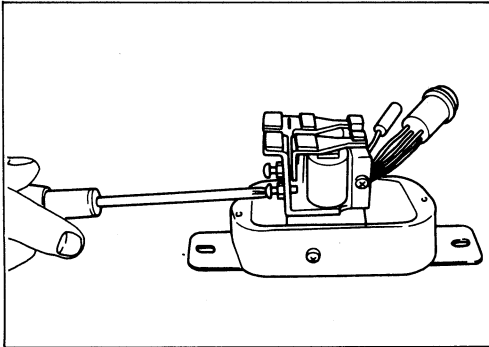
Adjustment of the voltage regulator

If the no load regulated voltage is not within the 13.8 to 14.8 range, adjust the regulator setting.

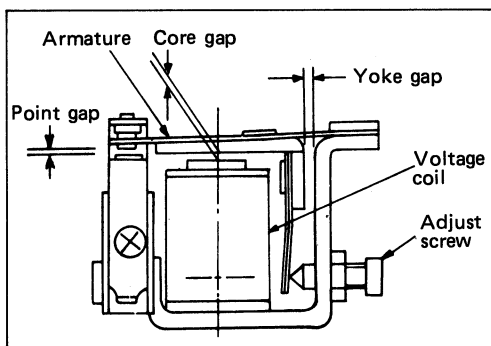
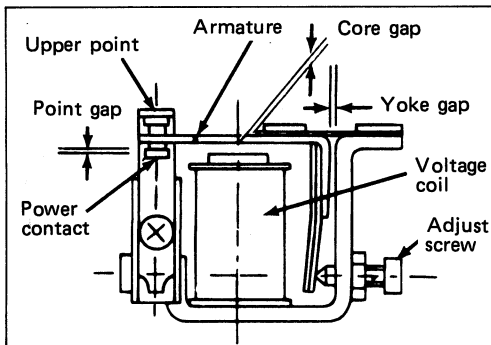
1. If the regulated voltage is too high, adjust it by bending the core arm "D" down. If the voltage is too low, bend arm "D" up.
2. If core arm adjustment will not correct the regulated voltage, proceed to point gap adjustment.
3. Disconnect the battery ground cable. Depress the armature until the moving point contacts "E" side point. Bend the point arm "E" to obtain an armature gap of 0.3 mm (0.012 in.) more.
4. Release the armature and adjust the gap between the "E" side point and the moving point by bending the point arm "F". Gap should be 0.3 to 0.46 mm (0.012 to 0.018 in.).
5. After gap adjustment is made, recheck the no-load regulated voltage under operating conditions. Repeat core arm adjustment if necessary.



4. Adjust the point gap by loosening the 3 mm (0.12 in.) screw attaching the upper contact. Move the upper contact up or down as required. Standard point gap is 0.3 to 0.4 mm (0.012 to 0.016 in.).



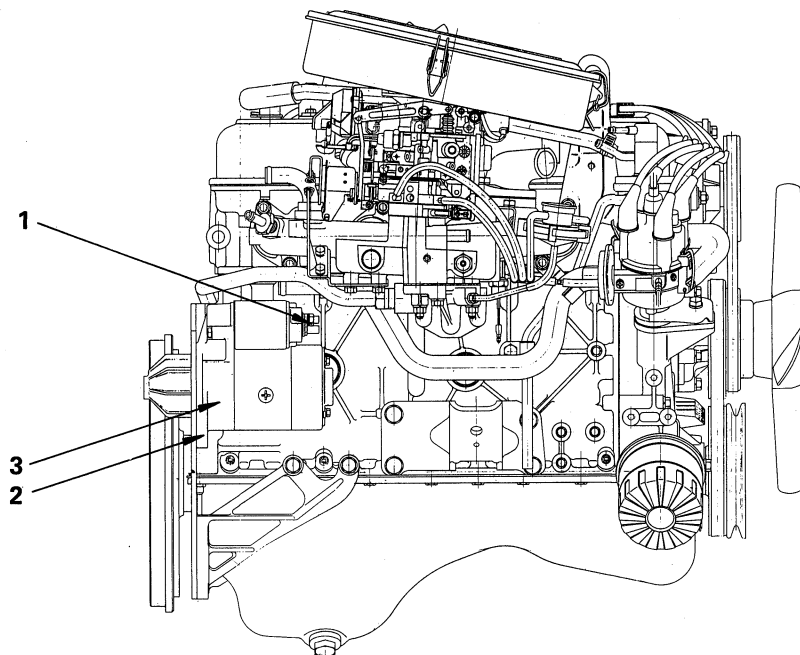
5. Adjust the regulated voltage by means of the adjusting screw. Turn the adjusting screw in to increase the regulated voltage and out to reduce. When correct adjustment is obtained, secure the adjusting screw by tightening the lock nut.
6. When the adjustment procedure is completed, reinstall the regulator cover and wiring and recheck the voltage.



STARTER MOTOR



REMOVAL AND INSTALLATION



Removal steps

Before removal, disconnect the battery
grounding cable

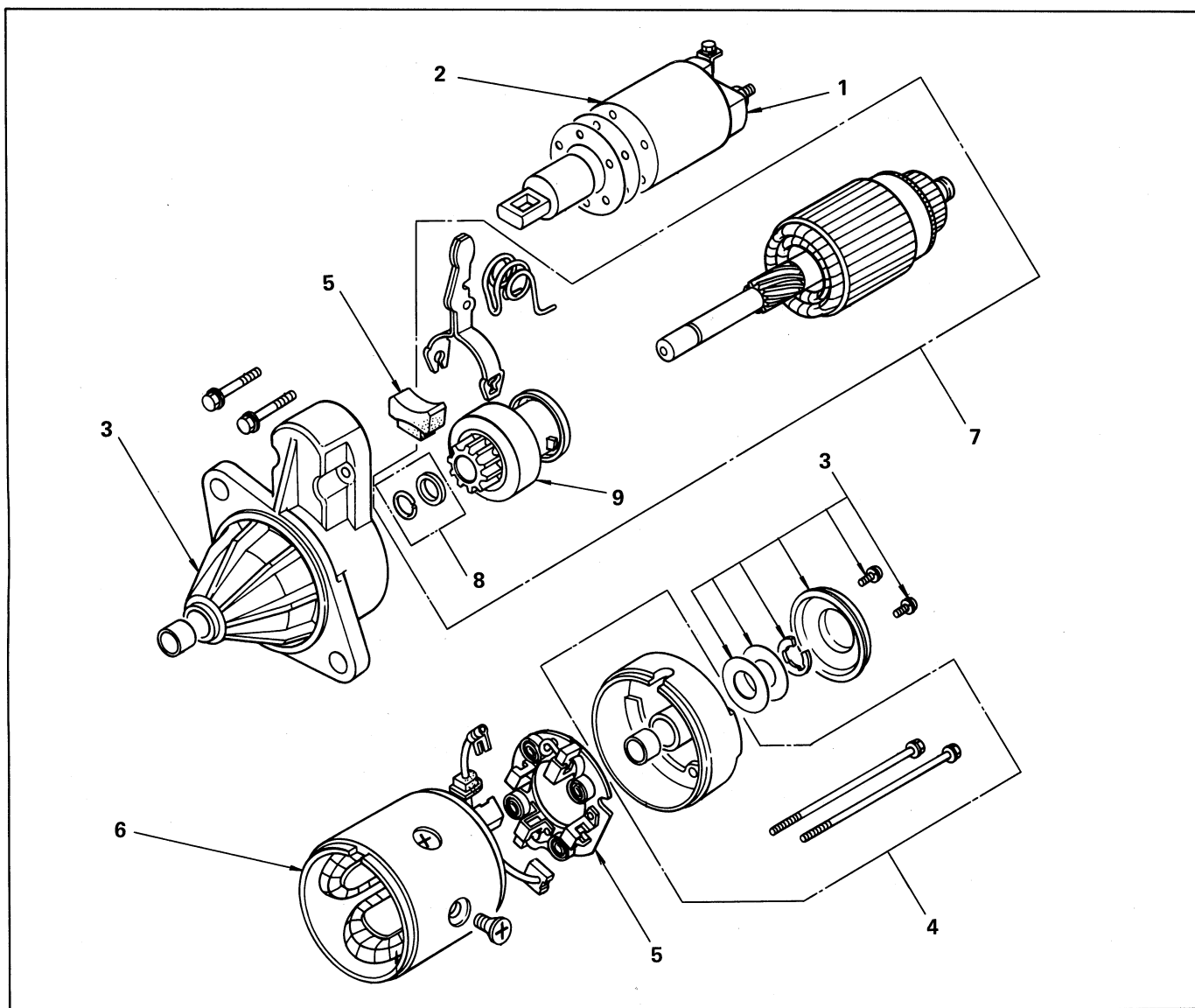
1. Wiring ; starter magnetic switch
2. Nuts and bolts
3. Starter motor assembly

Installation steps

To install, follow the removal procedure in reverse
order



DISASSEMBLY AND REASSEMBLY

**Disassembly steps**

1. Lead ; M/ terminal (magnetic switch)
- ▲ 2. Magnetic switch assembly
3. Dust cover and snap ring
- ▲ 4. Rear cover assembly and gear case assembly
- ▲ 5. Brush holder assembly
- ▲ 6. Field coil assembly and gasket
- ▲ 7. Armature assembly, with shift lever
8. Pinion stop clip
9. Pinion assembly

Reassembly steps

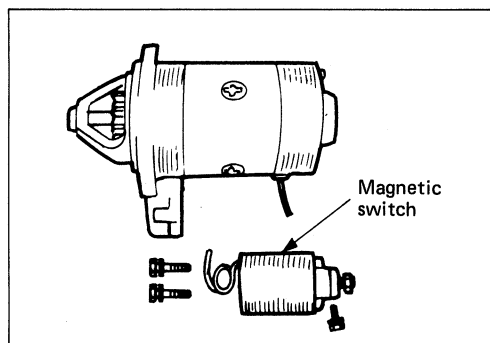
To reassembly, follow the disassembly procedure in reverse order.

Note:

- Apply new grease to the bearings and sliding faces of the parts before installation.
- Set the shift lever to the shift lever guide on the pinion.

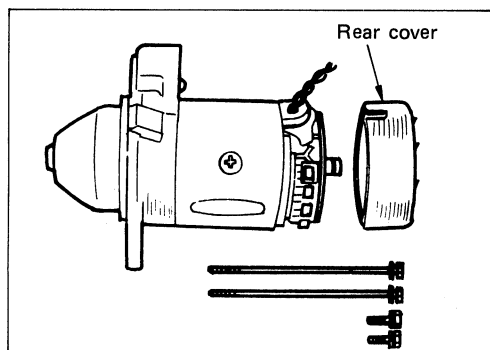


Important operations

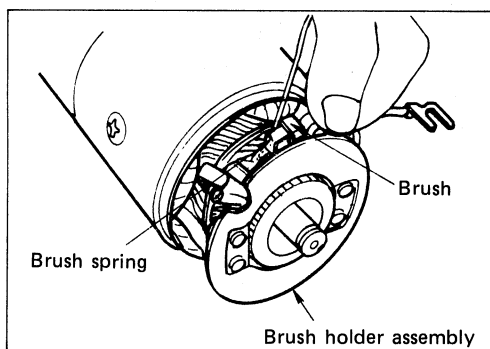


2. Magnetic switch assembly

- Remove the bolts attaching the magnetic switch.
- Remove the magnetic switch.
- Pull the torsion spring out of the magnetic switch.

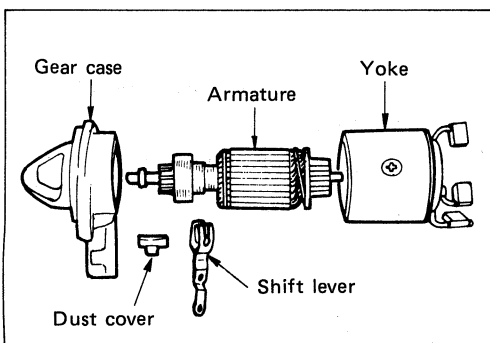


4. Rear cover assembly



5. Brush holder assembly

Raise the brush spring, pull out the brush, then remove the brush holder assembly.



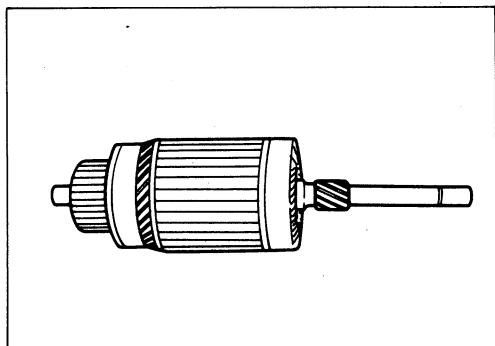
6. Field coil assembly and gasket

- Carefully remove the field coil assembly from the gear case and then remove the dust cover.

7. Armature assembly



INSPECTION AND REPAIR

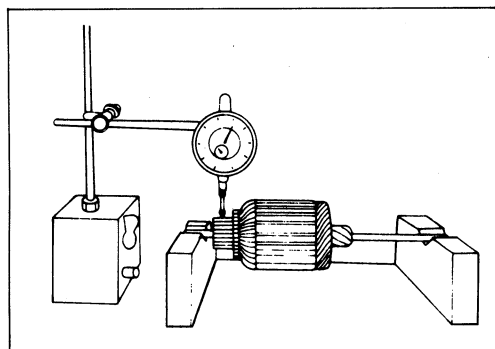


Armature

Check the commutator surface for roughness or burnig and reface it with fine sand paper as necessary. If roughness or out-of-round is considerable, the armature should be turned down on a lathe.

Standard outside diameter = 40 mm (1.575 in.).

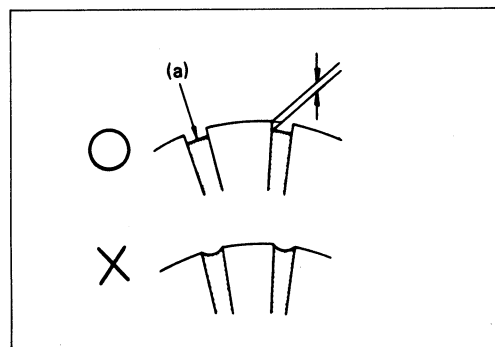
Limit of reduction in outside diameter = 2 mm
(0.0787 in.).



Measure the outside diameter of the commutator at the portions where the diameter is largest and smallest. Compare the measured values to determine the amount of uneven wear. If the amount of out-of-round or uneven wear is outside the limit, the commutator should be turned down on a lathe.

Value indicating need for servicing = 0.4 mm
(0.0157 in.) more

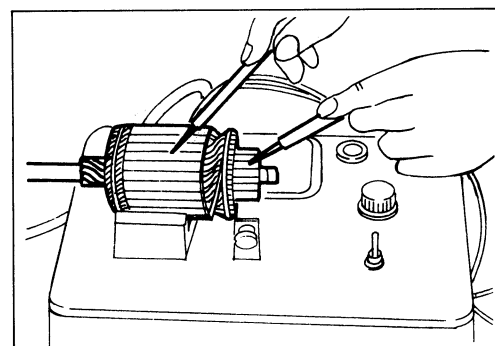
Correcting accuracy = 0.05 mm (0.0020 in.).



Measure the depth of under-cut insulator from the face of the commutator and correct it if the measured value is outside the limit.

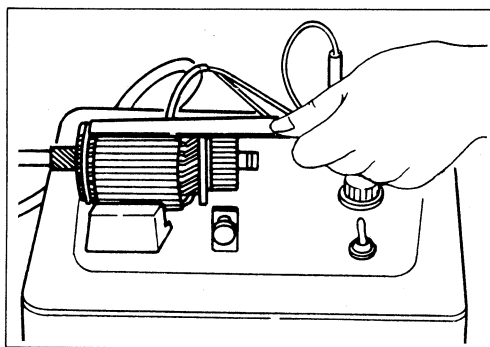
Value indicating need for servicing = 0.2 mm
(0.0079 in.) or less

Accuracy of correction = 0.5 to 0.8 mm
(0.0197 to 0.0315 in.).



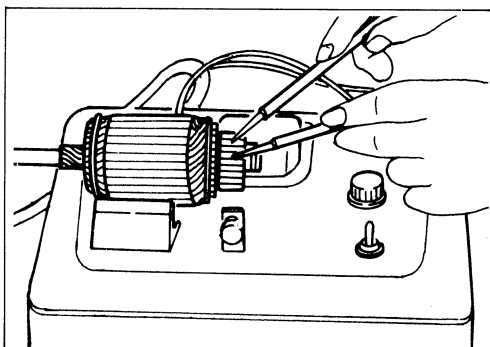
Testing of the armature coils for insulation

Check the insulation between the commutator coils and core using a growler tester. If the light of the growler tester turns on, the coils are poorly insulated and should be replaced.



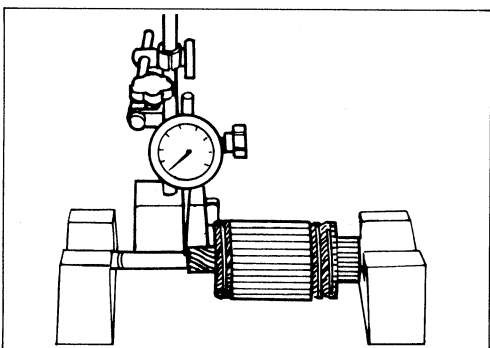
Testing of the armature coils for shorts

Roll the armature on the growler tester slowly while holding a strip of steel (or a hacksaw blade) over each segment of the armature core. If the strip of steel or hacksaw blade is pulled or vibrates, the armature coils are shorted and should be replaced.



Testing of the armature coils for continuity

Make a continuity test between the commutator segments using a growler tester. If the light of the growler tester does not turn on when the tester leads are connected across the segments, the coils are open and should be replaced.



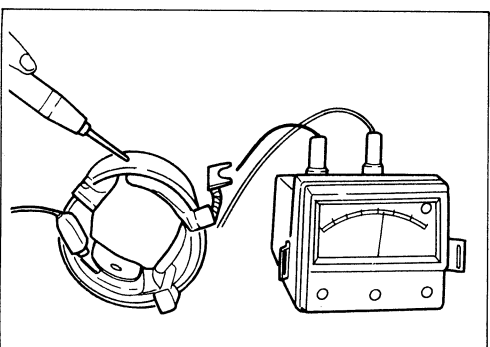
Checkig of the armature shaft for run-out

Check the armature shaft for run-out using a dial indicator. If the amount of run-out is beyond the value indicating need for servicing, correct or replace it with a new one.

Value indicating need for servicing = 0.08 mm (0.0031 in.).

Check the shaft and the bearings for wear, maximum allowable clearance between the shaft and the bearing is 0.2 mm (0.0079 in.).

If the rear bearing is replaced with a new one, check the clearance and ream as necessary.



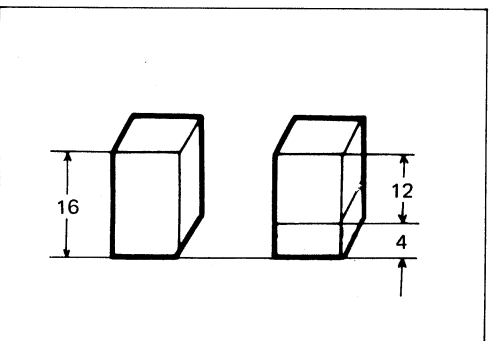
Field coils

With an ohmmeter, measure the resistance between the field coils and the yoke.

Insulation resistance = 1 megohm or more.

If the insulation is in poor condition, remove the pole core set screws and locate the parts grounded by removing the field coils one at a time; correct as necessary.

Make a continuity test between the field coil terminals and correct or replace the parts as necessary.



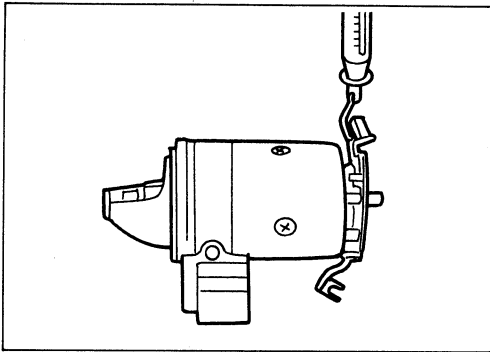
Brush and brush holder

Check the brushes for wear, cracks or broken lead.

Replace the parts with new ones if they are found to be defective.

Standard brush length = 16 mm (0.6299 in.).

Limit for use = 12 mm (0.4724 in.).

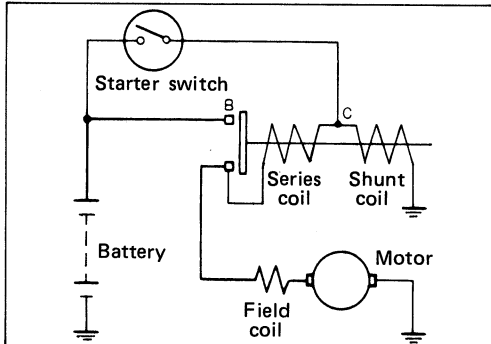


Check the brush springs for rusting, distortion, weakening or breakage and replace them with new ones as necessary.

Spring tension = 1.6 kg (3.53 lbs.)



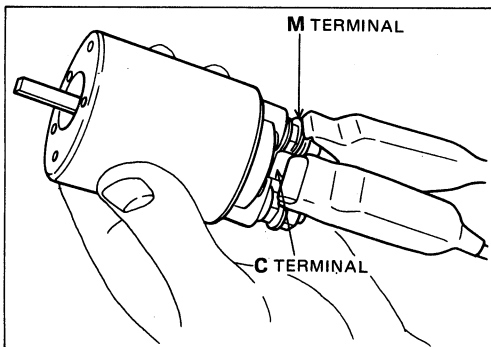
Clean the brush holder to remove carbon and check for insulation between the insulated brush holder and the plate using an ohmmeter. If the test indicates poor insulation condition, correct or replace the parts with new ones.



Magnetic switch

Check the points in the magnetic switch for fouling or roughness and dress them with an oil stone as necessary.

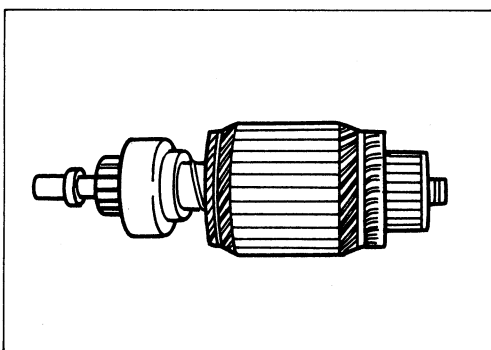
Make a continuity test between the C and M terminals (series coil) and between the C terminal and ground (shunt coil) using a circuit tester. If the tester does not indicate continuity, the coil is open and the magnetic switch should be replaced.



The magnetic switch is normal when the plunger is pulled when 12 volt power is applied between the C and M terminals of the switch and returns smoothly as the power is cut off.

Check the gap between the pinion and pinion stop when the pinion becomes fully depressed by the action of the magnetic switch. If the measured value deviates from the specific range, adjust by installing an adjusting plate between the magnetic switch and gear case.

Standard gap = 0.3 to 2.5 mm (0.0118 to 0.0984 in.).



Pinion

Check the pinion gear for wear or damage and replace it with a new one if necessary.

Check the sliding face of the pinion for scuffs or causes of sticking and correct or replace it with a new one if necessary.

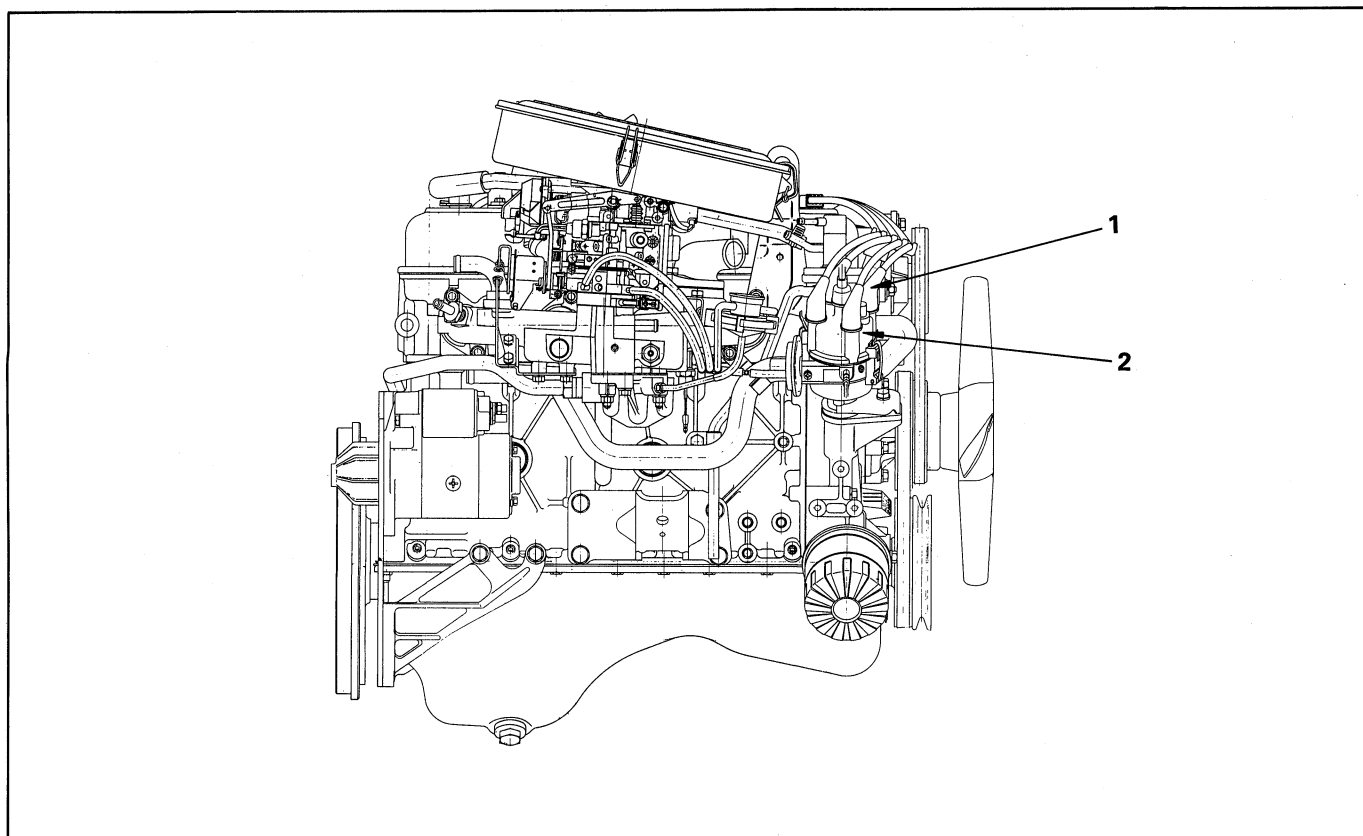
Check the springs for distortion, weakening or breakage, and replace them with new ones as necessary.

Check the clutch for sticking or binding and replace it necessary.

DISTRIBUTOR



REMOVAL AND INSTALLATION



Removal steps

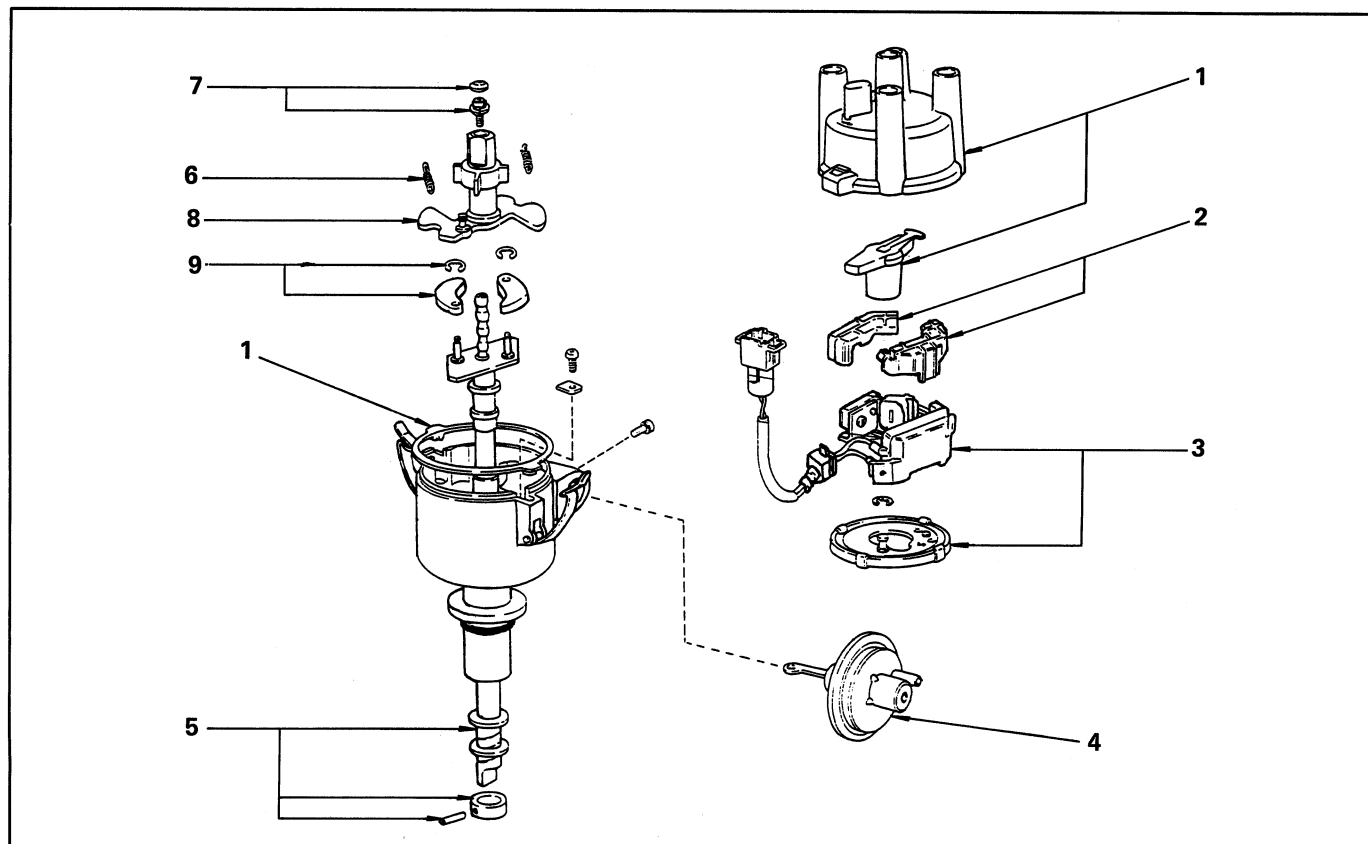
1. High-tension cables
2. Distributor assembly

Installation steps

2. Distributor assembly
1. High tension cables.



DISASSEMBLY

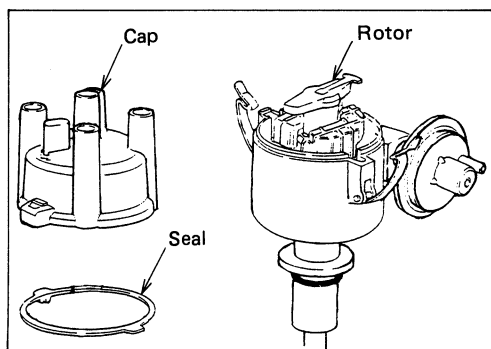
**Disassembly steps**

- ▲ 1. Distributor cap, seal and rotor
- ▲ 2. Igniter covers
- ▲ 3. Igniter assembly
- ▲ 4. Vacuum advancer
- ▲ 5. Pin, collar and governor
- ▲ 6. Springs
- ▲ 7. Cap and screw;
- ▲ 8. Signal rotor
- ▲ 9. Snap ring and weights

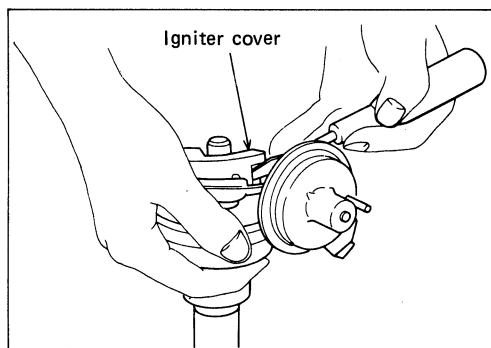


Important operations — Disassembly

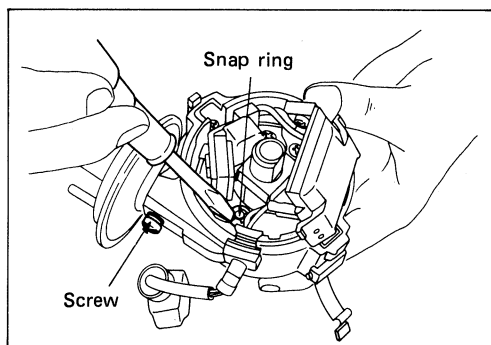
1. Distributor cap, seal and rotor



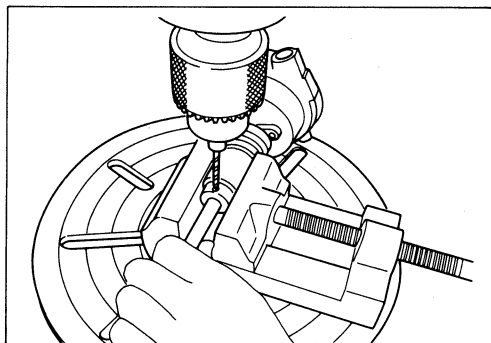
2. Igniter covers

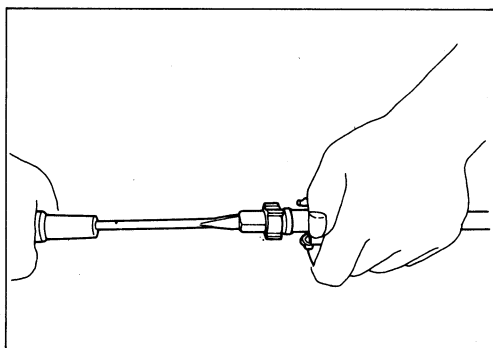


4. Vacuum advancer



5. Pin, collar and governor shaft





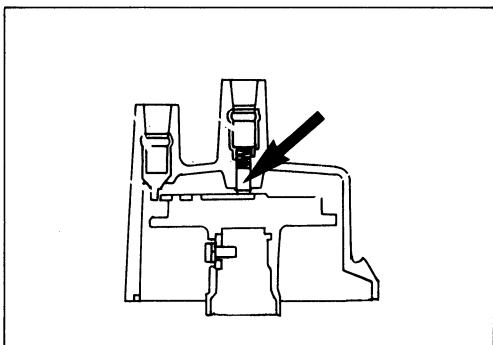
7. Cap and screw



INSPECTION AND REPAIR

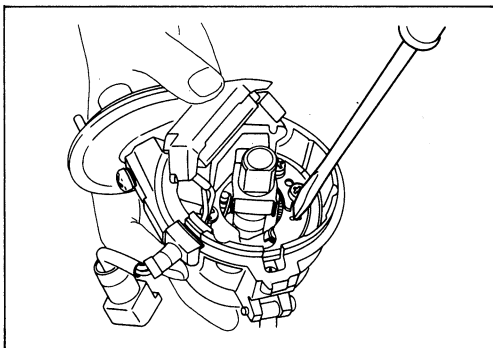


Wash the disassembled parts and check for wear or damage; correct or replace them as necessary. Do not wash the inner face of the vacuum advancer.



Distributor cap

Check the distributor cap and rotor for cracks and carbon tracks. Check the distributor cap center contact for wear. Center contact should be 2.2 mm (0.087 in.) or longer.



Air gap

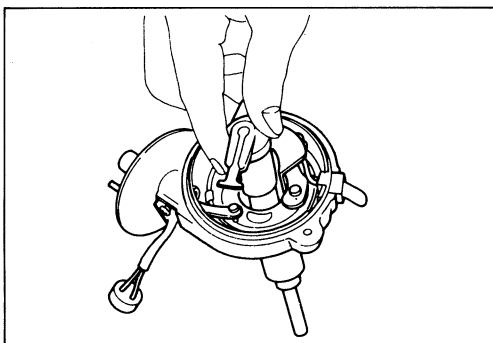
Using a feeler gauge, measure the air gap between the pick-up coil projections.

Air gap : 0.2 to 0.4 mm (0.008 to 0.016 in.).



Adjust air gap if necessary.

Loosen the two screws and move the igniter until the gap is correct. Tighten the two screws and check the air gap.

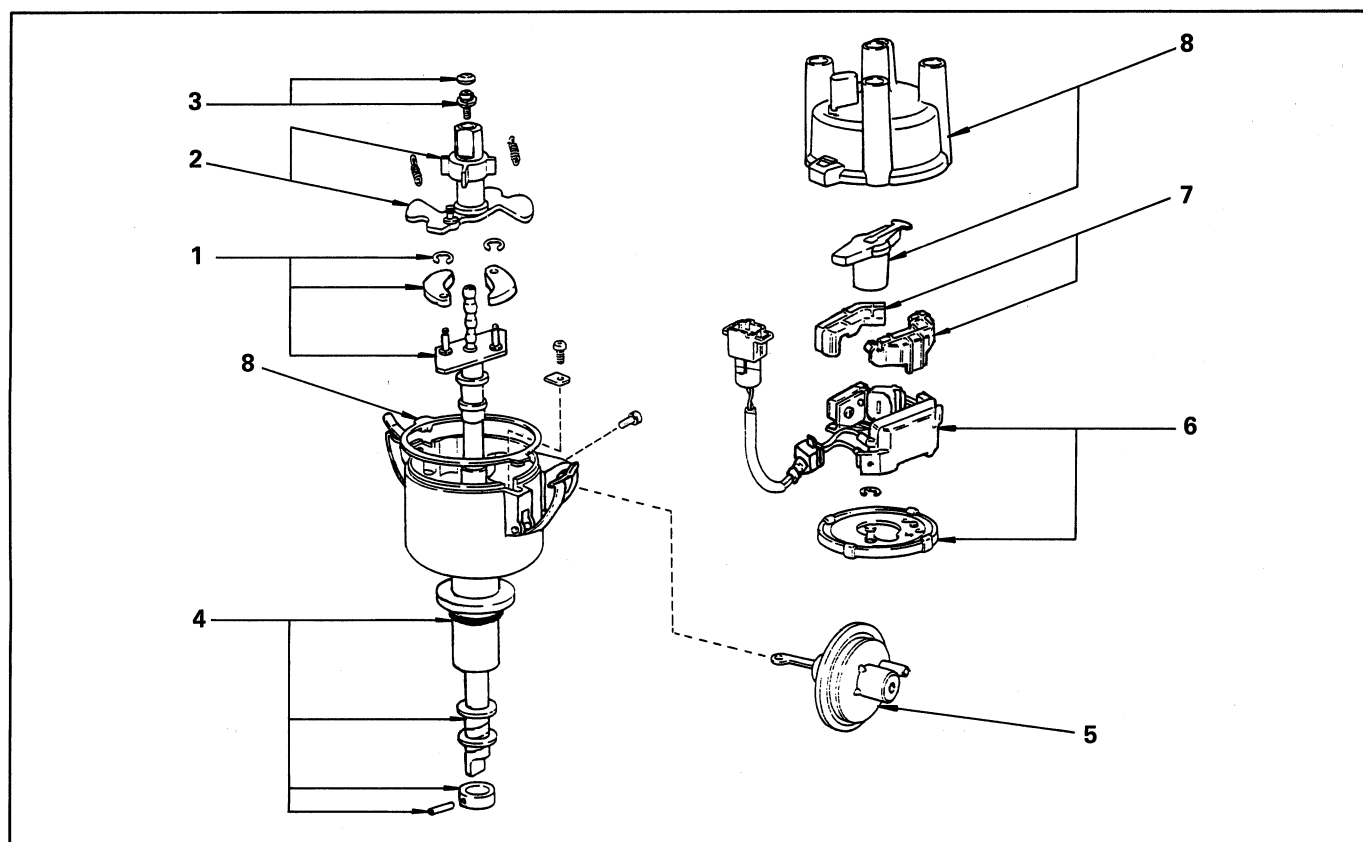


Governor advance

Turn the rotor shaft counter-clockwise, release it and check that the rotor returns slightly counter-clockwise.



REASSEMBLY



Removal steps

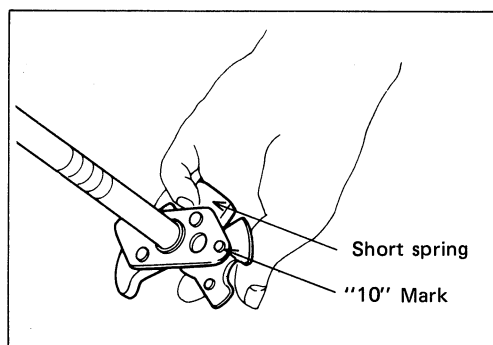
- | | |
|--|---|
| <ul style="list-style-type: none"> ▲ 1. Weights and snapping ▲ 2. Signal rotor and spring ▲ 3. Cap and screw ▲ 4. Pin, collar, governor shaft and O-ring | <ul style="list-style-type: none"> ▲ 5. Vacuum advancer ▲ 6. Igniter assembly ▲ 7. Igniter cover ▲ 8. Distributor cap, seal and rotor |
|--|---|



Important operations

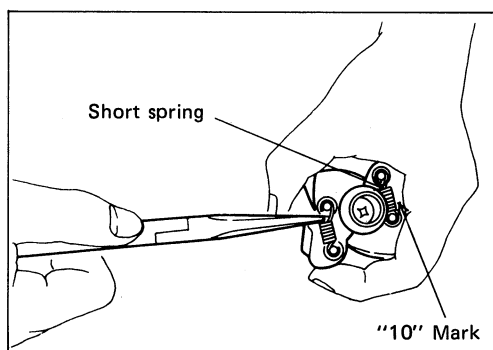
1. Weights and snapping

- Attach the weight to governor shaft, aligning the "10" mark with the stopper.



2. Signal rotor and spring

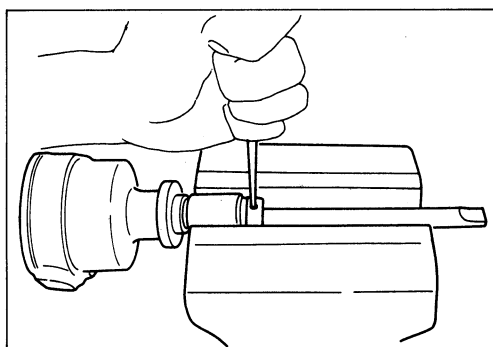
- Attach the signal rotor to the governor shaft, apply grease to the top of signal rotor, and seal it with the cover.
- When assembling the governor shaft to the distributor housing, apply oil to the shaft and washer.
- When installing a new collar, select the washer cap to make the clearance between the collar and the housing from 0.15 to 0.5 mm.



Parts No. (washer cap)	Thickness mm(in.)
8-94223922-0	2.9 (0.114)
8-94223921-0	2.7 (0.106)
8-94206156-0	2.5 (0.098)
8-94110977-0	2.3 (0.091)

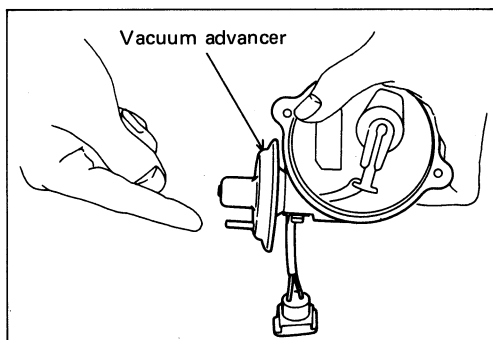
4. Pin, collar governor shaft and O-ring

- Align the hole and install a new pin using hammer. Peen both ends of the pin in a vise.
- Replace the O-ring with new one.



5. Vacuum advancer

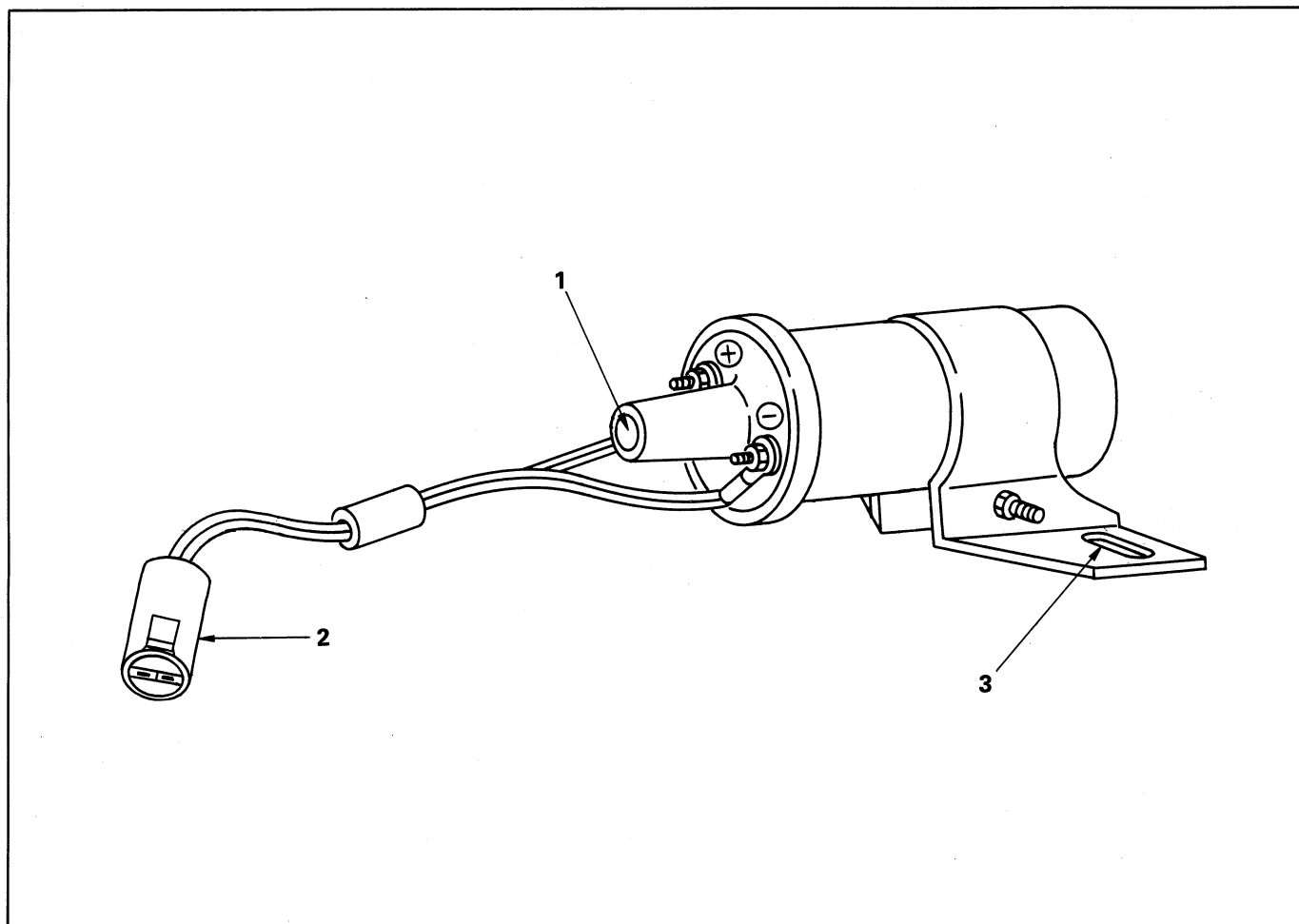
Apply vacuum and check that vacuum advancer moves.



IGNITION COIL



REMOVAL AND INSTALLATION



Removal steps

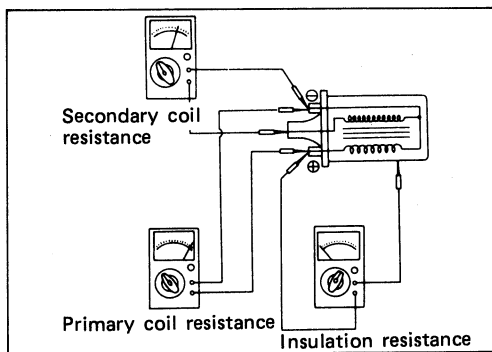
1. High-tension cable
2. Lead (positive and negative terminals)
3. Bolts ; attaching

Installation steps

To install, reverse the removal procedure.



INSPECTION



1. Check the outer face of the ignition coil for cracking, rusting, or damage, paying particular attention to the socket.
2. Check the resistance of the primary and secondary coils as shown in Fig. 17J-53. If the measured values deviate from the specified range, replace the ignition coil assembly.

Primary coil resistance = 1.130 to 1.529 ohms

Secondary coil resistance = 10.20 to 13.80 kilohms

Insulation resistance = 10 megohms or more

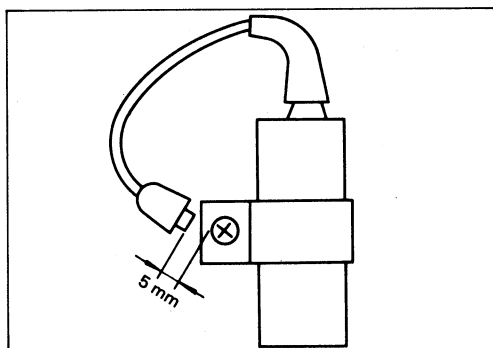
Check the insulator resistance of the ignition coil with the circuit tester switched to the high range. Even if the tester needle deflects slightly, the ignition coil is poorly insulated and should be replaced.

IGNITER

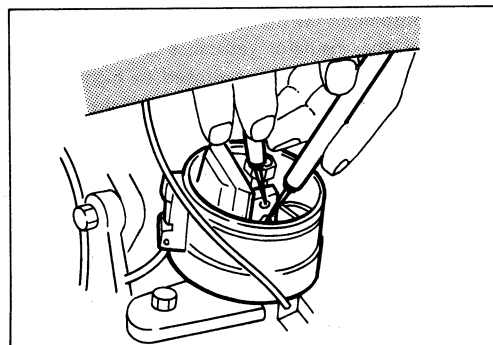
The igniter is integrated with the distributor. Refer to the Section on the distributor.



INSPECTION



1. Remove the distributor cap and the igniter cover.
2. Disconnect the high tension cable from the distributor side terminal.
3. Move the high tension cable end to the coil fixing screw and keep the clearance about 5 mm.



4. Using a ohmmeter set to the x 1 ohm or x 10 ohm range, connect the probe to the terminals between the pick-up coil and the igniter. (Fig. 17J-46).

Terminal wire color	Polarity
White	Positive
Red	Negative



Note: Do not apply voltage for more than 3 seconds. This prevents break down of the power transistor in the igniter.

5. When releasing one probe from a terminal, a spark should fly between the high tension cable and the engine block. If no spark flies, the igniter is defective.

HIGH TENSION CABLE

Refer to Section 00 "GENERAL
INFORMATION" servicing

SPARK PLUG

Refer to Section 00 "GENERAL
INFORMATION" servicing

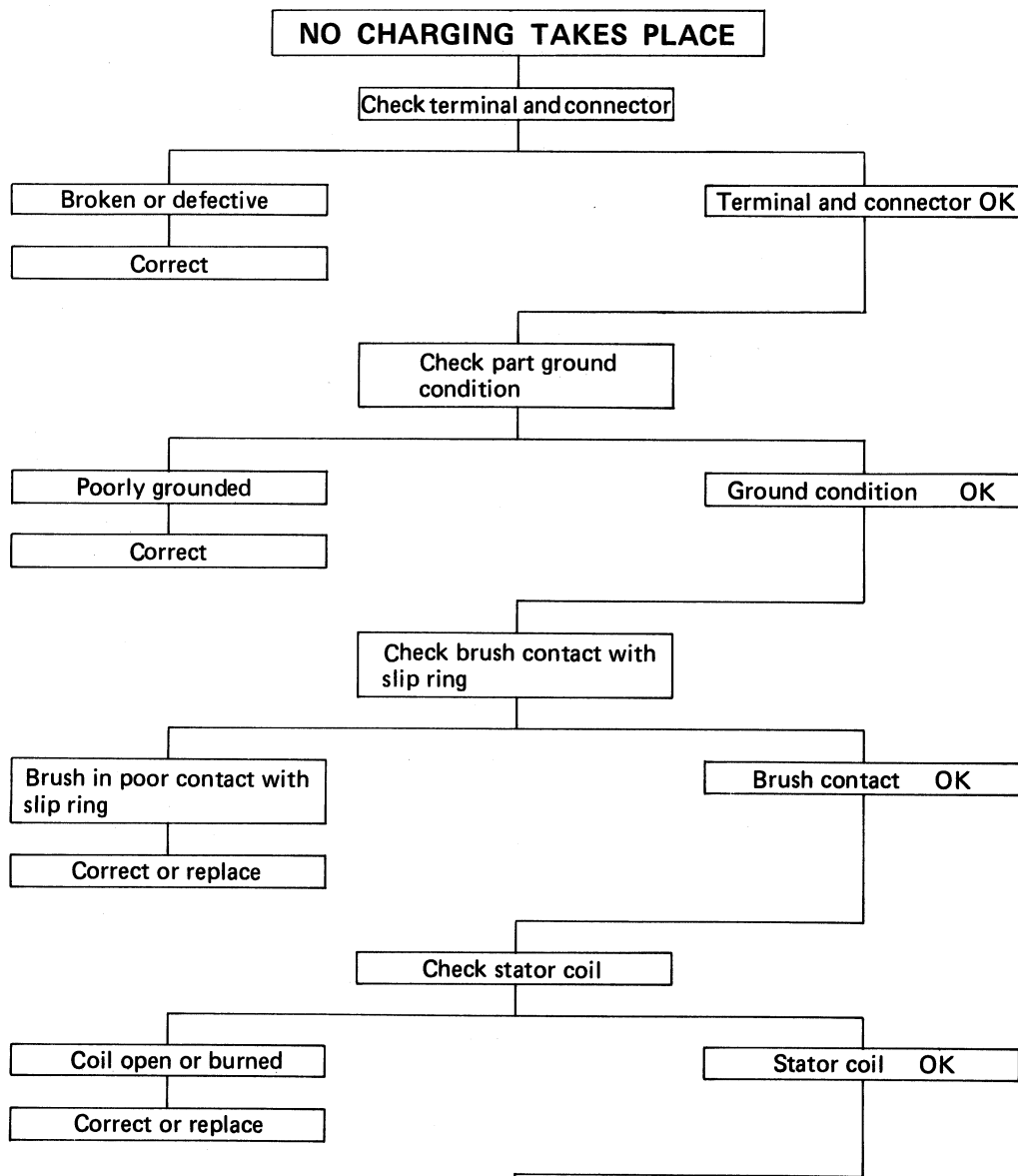
BATTERY

SPECIFIC GRAVITY CHART

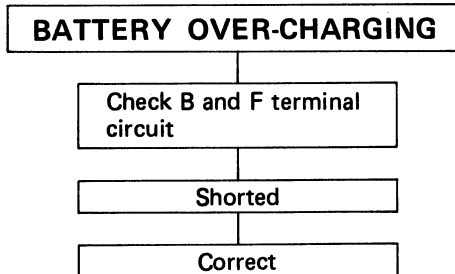
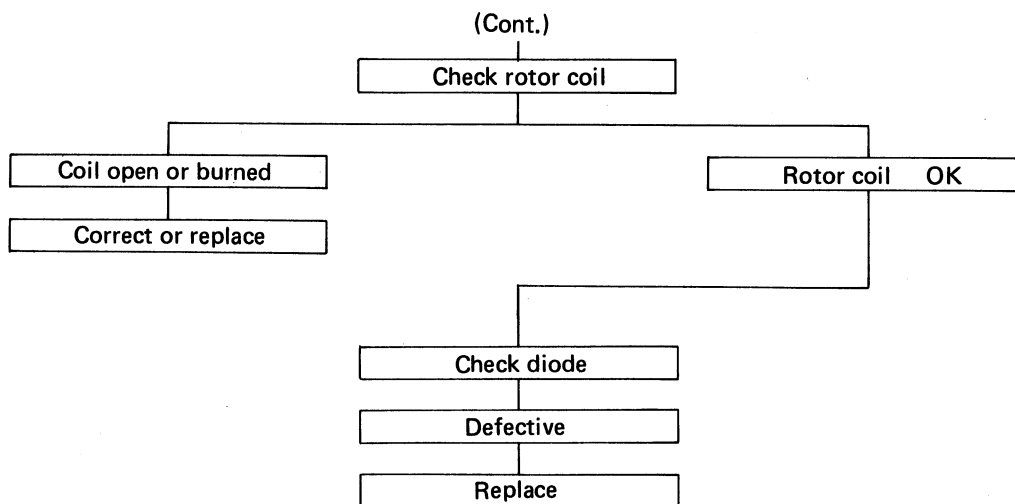
Specific gravity of electrolyte at 27°C (80°F)	Findings	Correction
1.280	Specific gravity too high	Adjust specific gravity while recharging battery.
1.240 — 1.270	Satisfactory	1. No further attention is necessary if difference in specific gravity of electrolyte in each cell is 0.015 or less. 2. If difference in specific gravity of electrolyte in each cell is more than 0.015, make a fullcharge hydrometer test. If test result indicates that battery is in good condition, adjust specific gravity while recharging battery.
1.200 — 1.240	Fair	1. Recharge battery. 2. If specific gravity of electrolyte in each cell is not equal, make adjustment while charging the battery.
1.200 or less	Unsatisfactory	1. Follow steps outlined under specific gravity reading for 1.240 to 1.200. 2. Check generator circuit short, loose connection and give necessary service attention.
When the difference in the specific gravity of electrolyte in each cell is 0.025 or more	1. Short in cell with lowest specific gravity reading 2. Leaking electrolyte 3. Level of electrolyte in cell too high or electrolyte diluted with water leaking into cell. 4. Self-discharged.	1. Recharge battery, then check specific gravity twice at one hour intervals and see if the measured values are approximately the same. 2. Adjust specific gravity of electrolyte in each cell to 1.255 to 1.260 while charging is pending. 3. Make a high-rate discharge test after discharging the battery continuously for 12 hours.

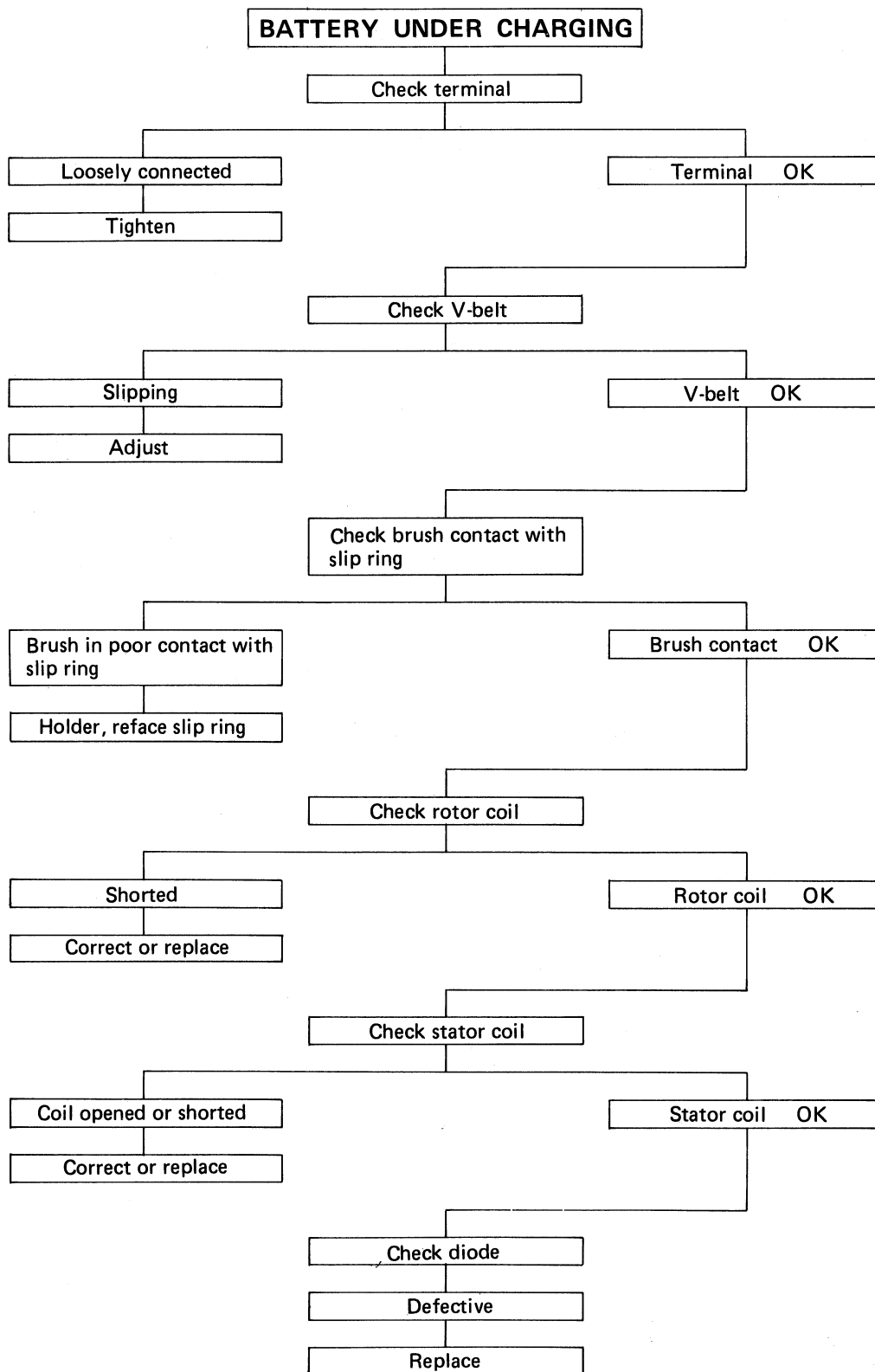
DIAGNOSIS (ENGINE)

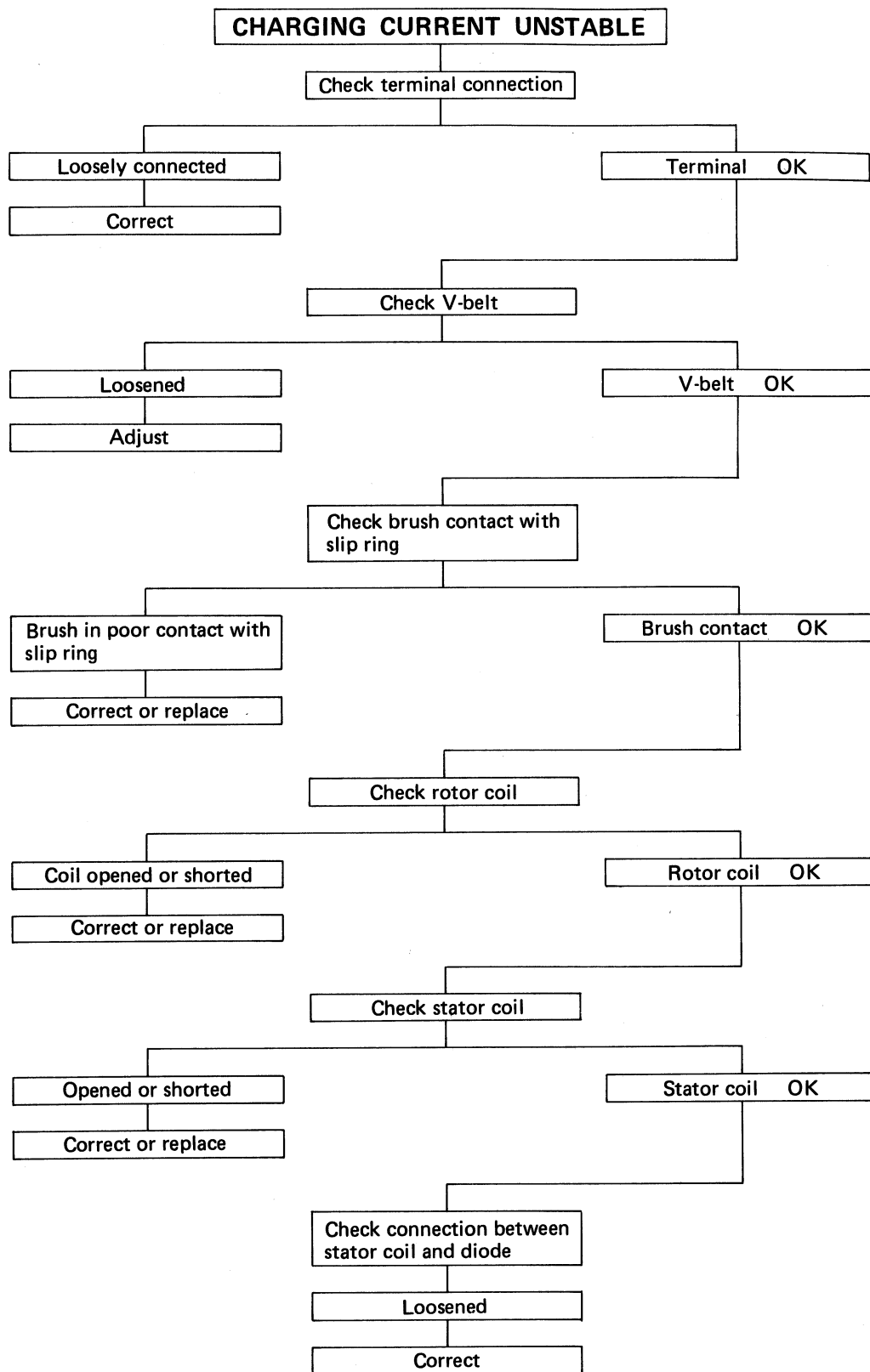
CHARGING AND NOISE PROBLEM

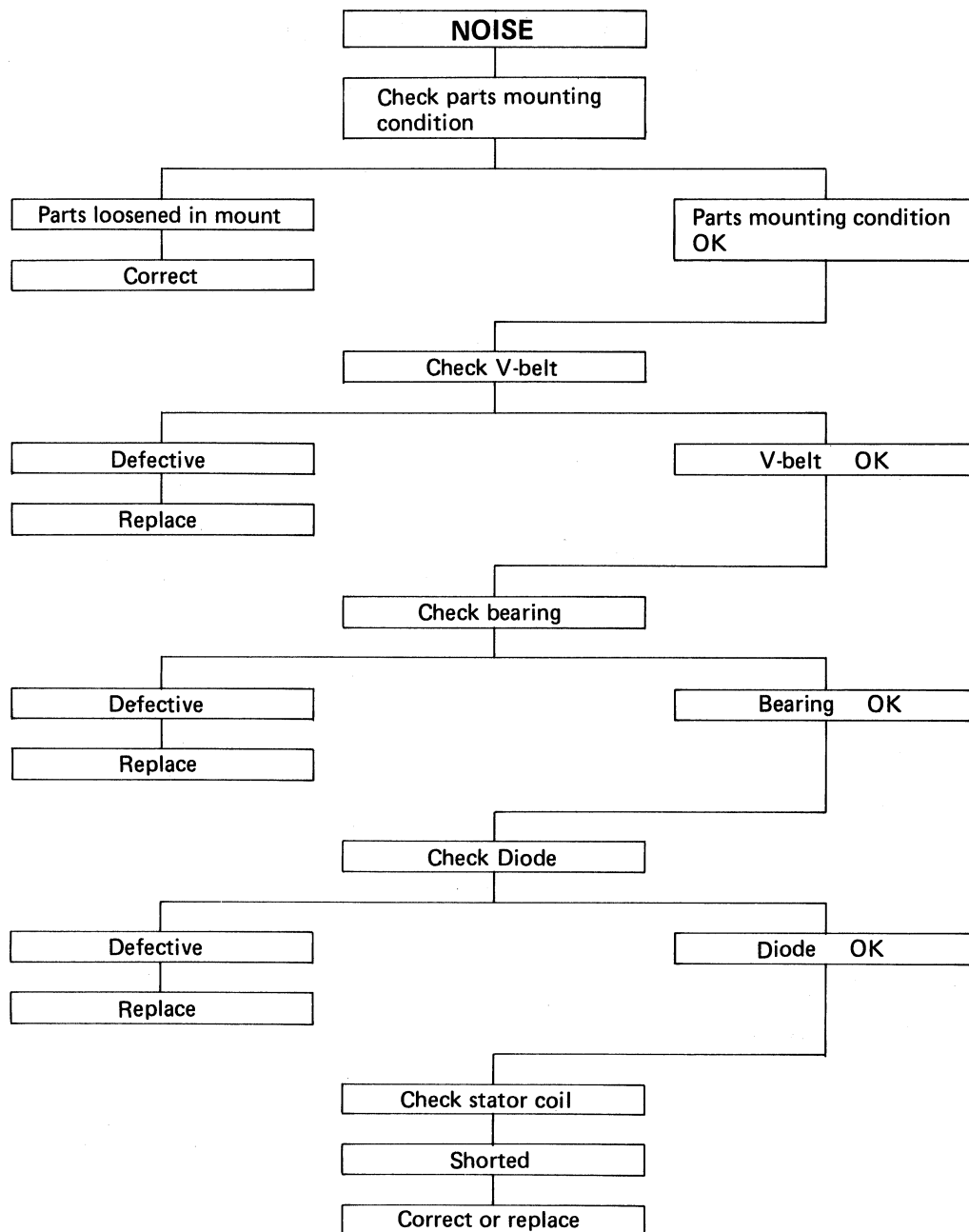


(Continued on next page)

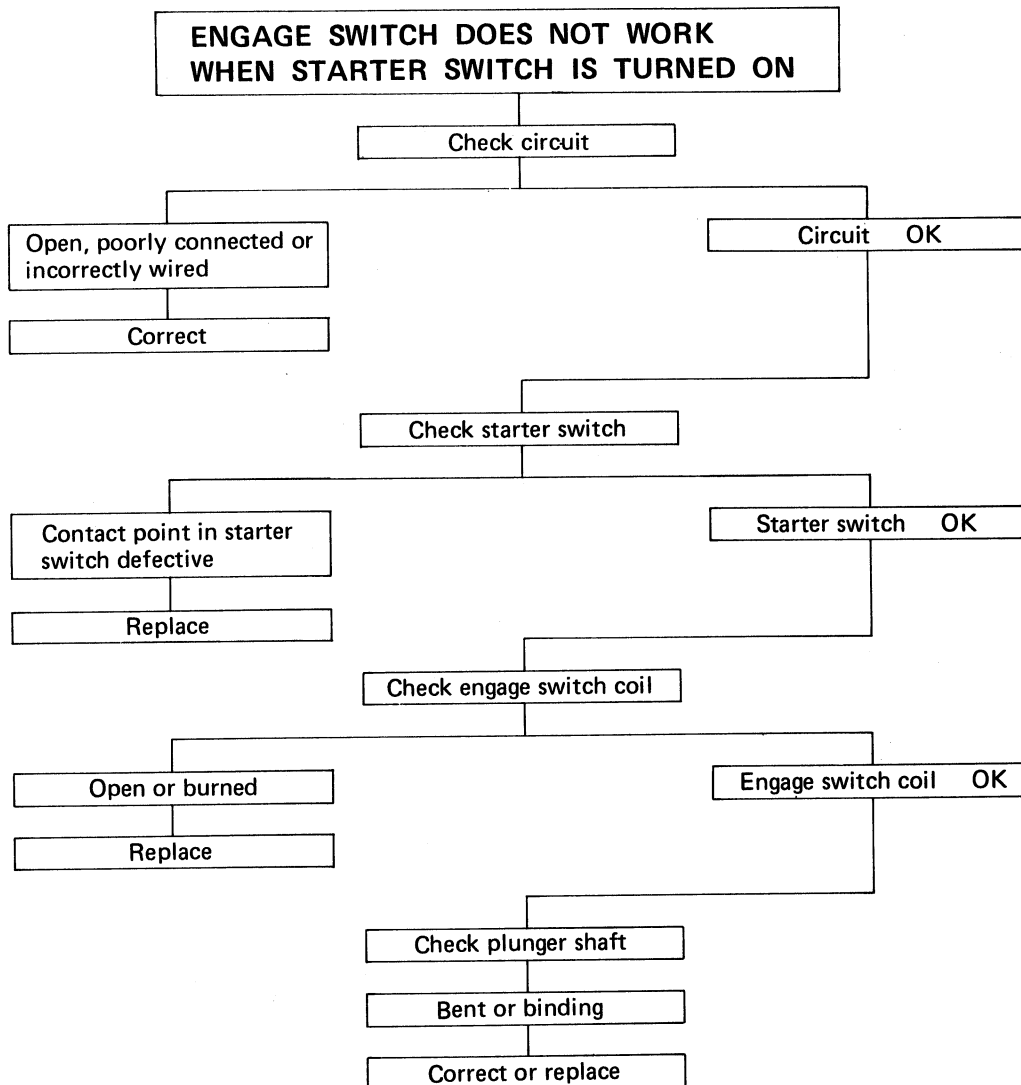


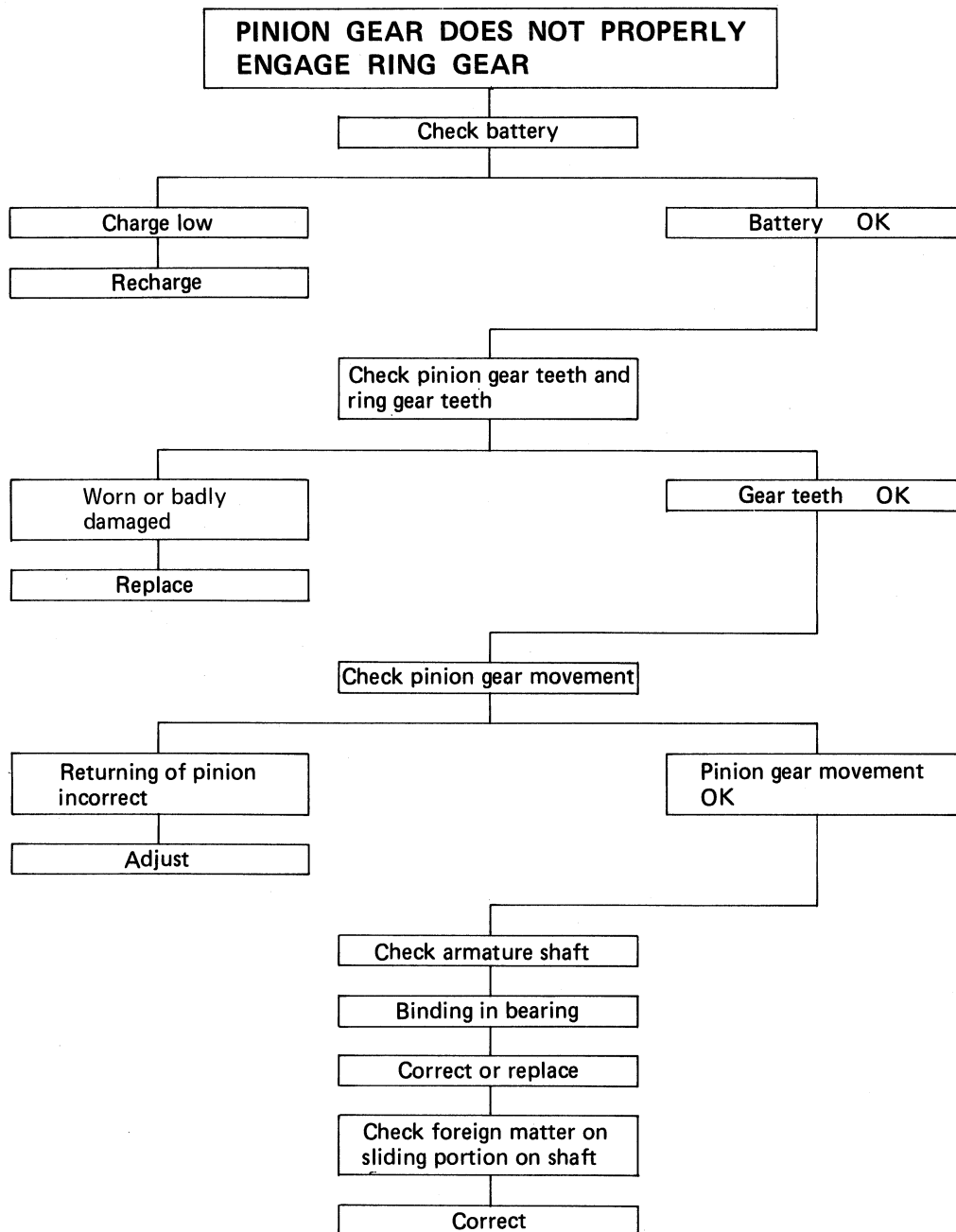


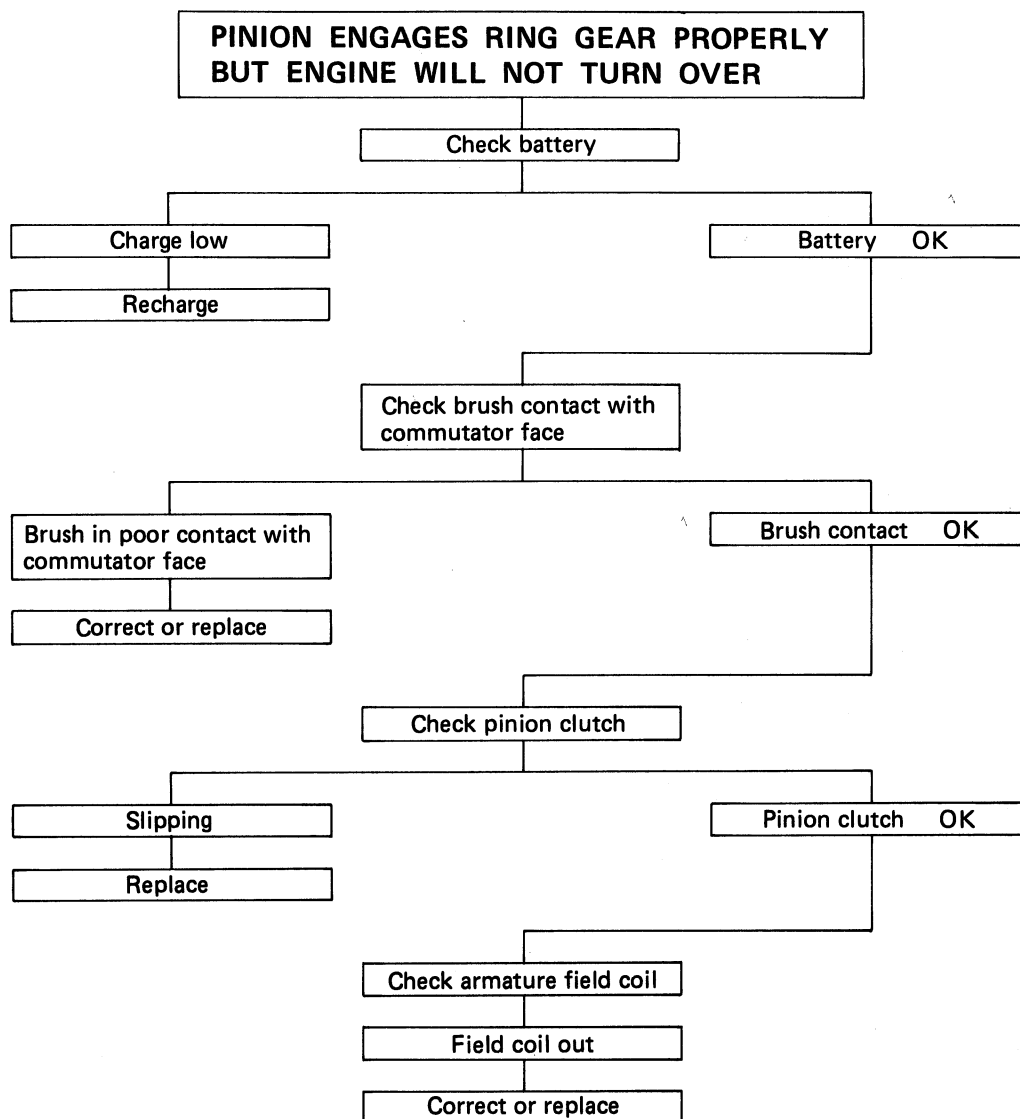


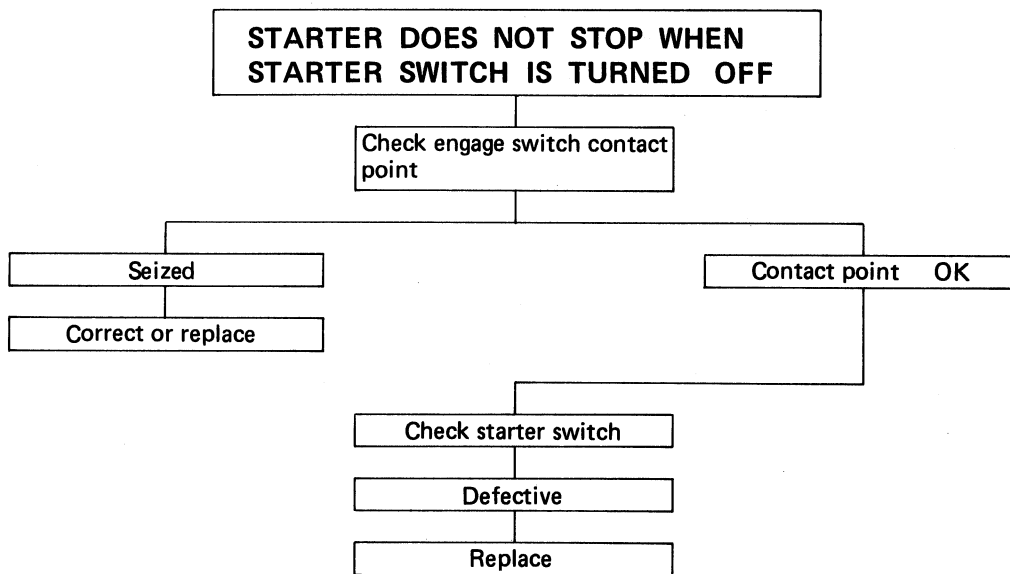


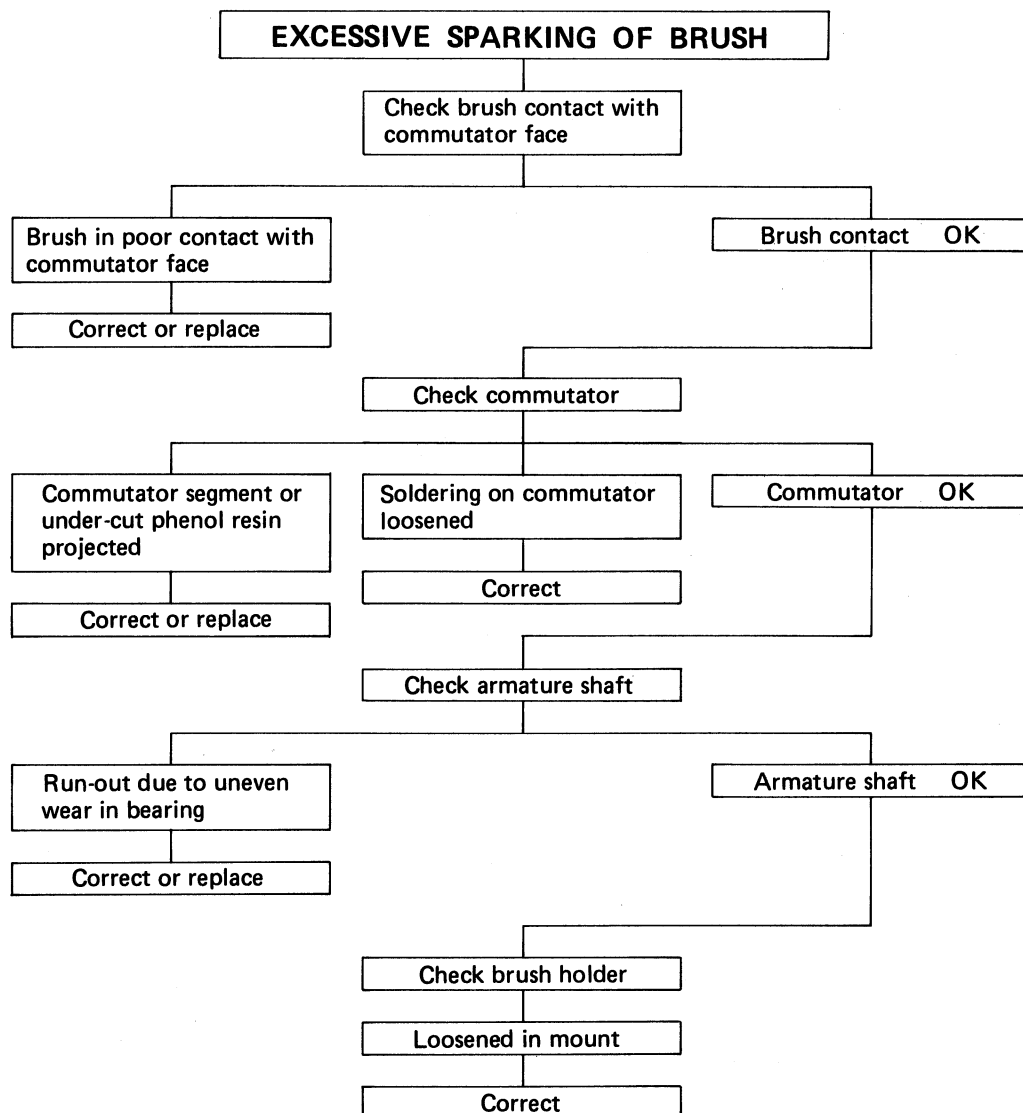
STARTER SWITCH AND STARTER MOTOR FAULTY



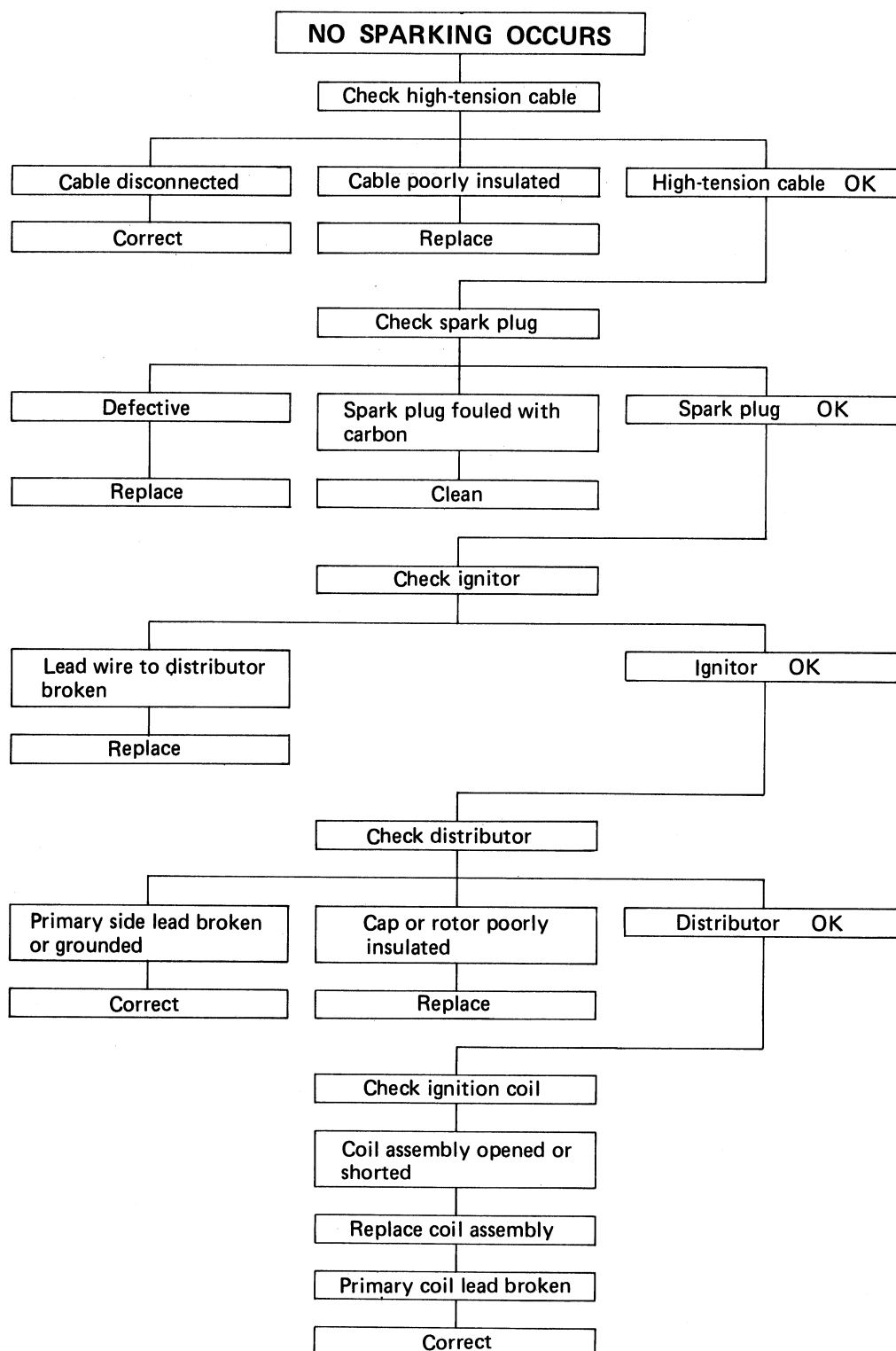








IGNITION FAULTY



**SPARK OCCURS IRREGULARLY
OR JUMPS ACROSS GAP OF
ONLY 1.0 to 2.0 mm (0.04 to 0.08 in.)**

Check ignition coil

Coil layer shorted

Replace

**SPARK JUMPS ACROSS GAP
OF 5.0mm (0.2 in.) OR MORE**

Check spark plug

Excessive spark plug gap

Correct or replace

Spark plug fouled with carbon

Clean or install hotter type
spark plug

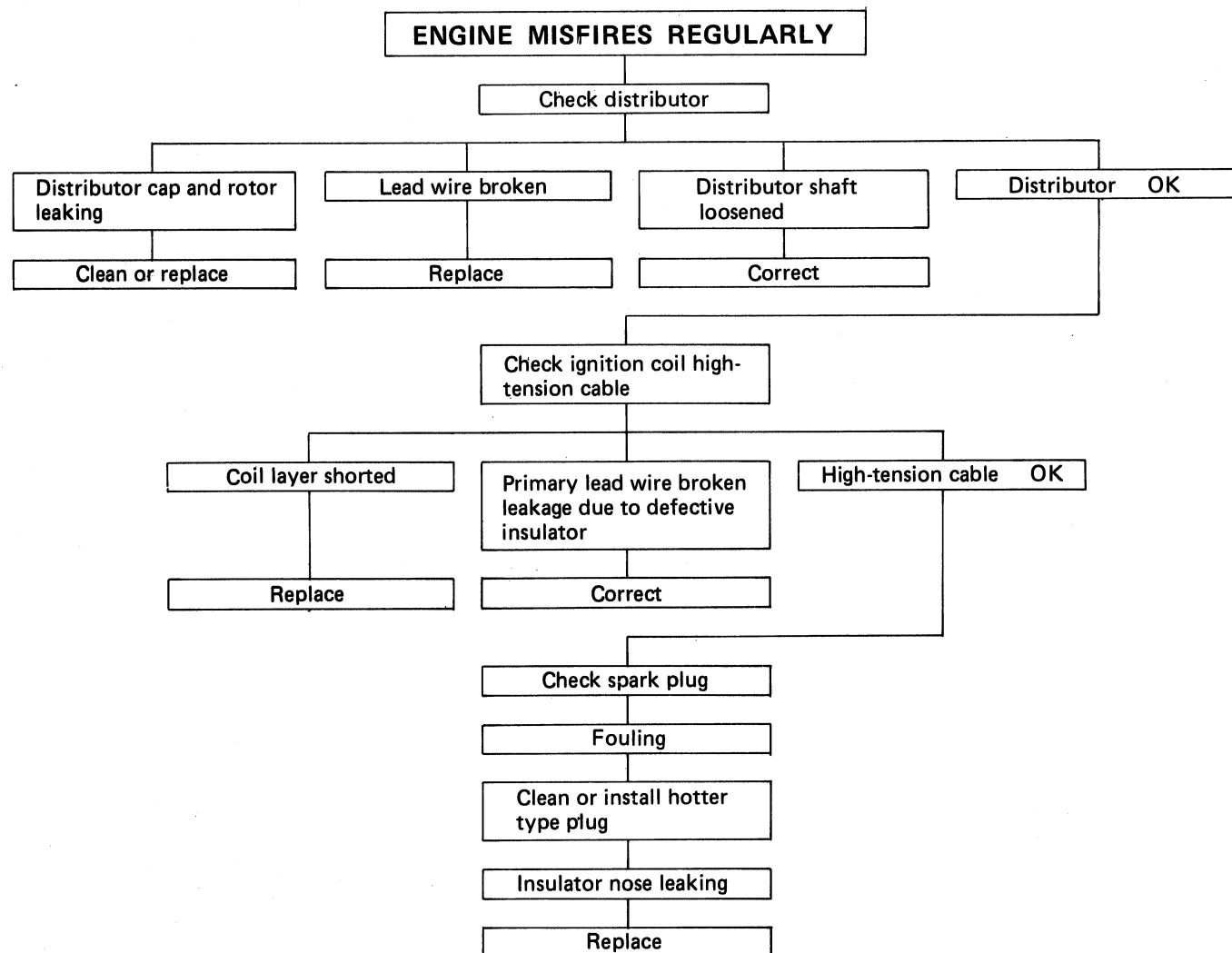
Porcelain insulator
broken

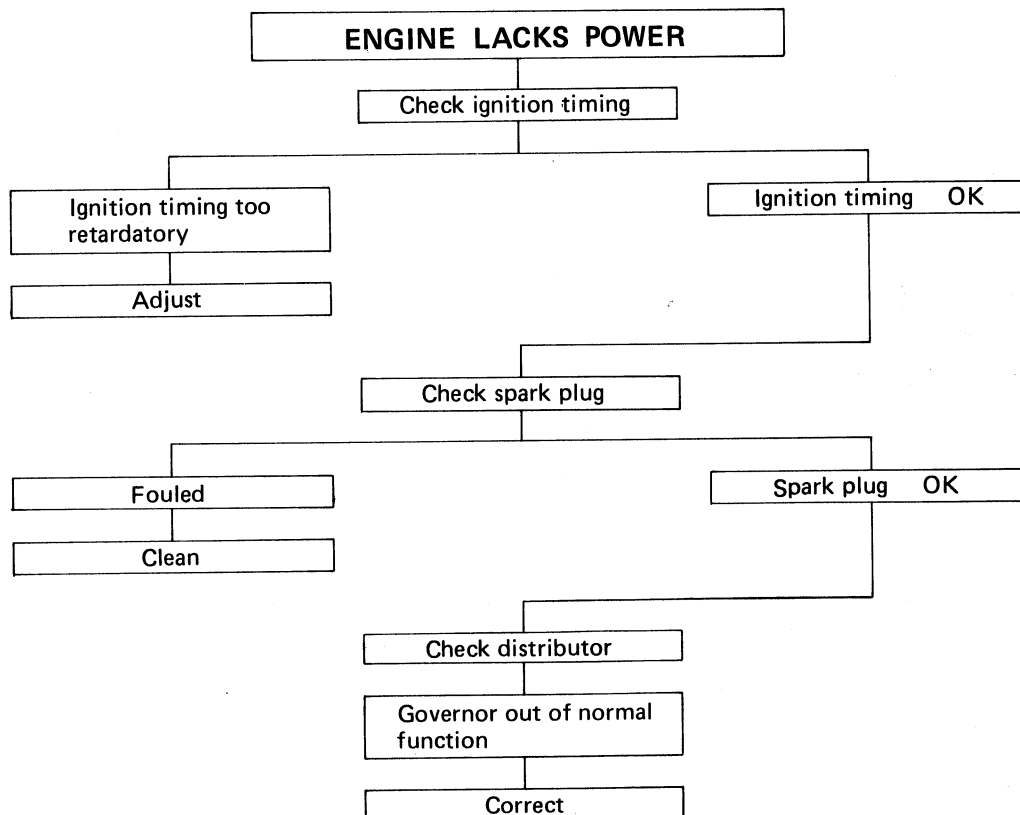
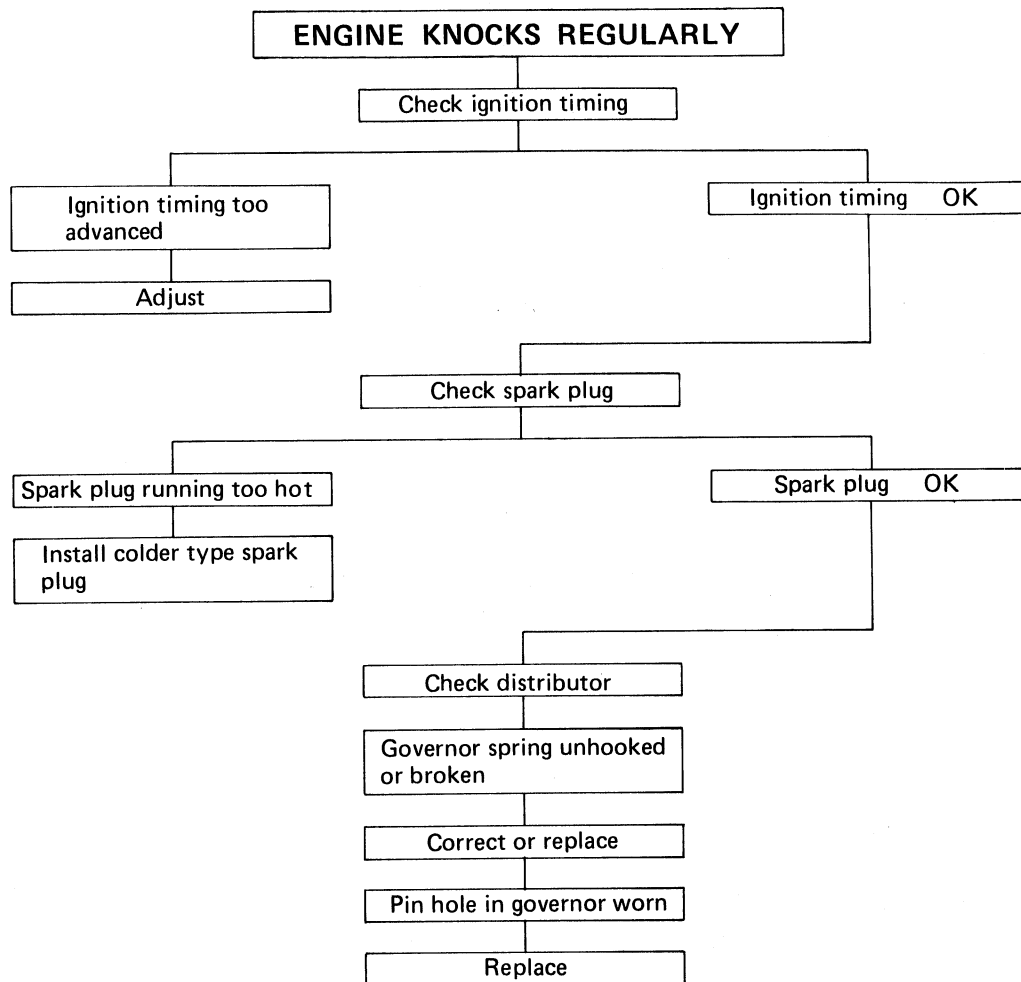
Replace

Spark plug electrodes worn
out

Replace

ROUGH ENGINE RUNNING





CHASSIS ELECTRICALS

MAIN DATA AND SPECIFICATIONS

LIGHTS

Name of lamp		Voltage-Wattage	Number of bulbs	Color of lens	Remarks
Head light		12V-50/40	2	White	
Front combination light					In common with the hazard warning light
Parking		12V-7.5W	2	Amber	
Turn signal		12V-23W	2	Amber	
Side marker		12V-3.8W	2	Amber	
Room (Dome) light		12V-10W	Each 1	White	
Rear combination lights	Stop lights Tail light	12V-23/8W	2	Red	In common with the hazard warning light
	Rear turn signal lights	12V-23W	2	Amber	
	Rear side marker lights	12V-3.8W	2	Red	
	Back-up lights	12V-23W	2	White	
License plate lights		12V-5W	1	White	
Indicator (Head lamp high beam light)		12V-1.4W	1	Blue	
Oil pressure indicator light		12V-1.4W	1	Red	
Parking brake indicator and fail indicator light		12V-1.4W	1	Red	
Seat belt warning light		12V-1.4W	1	Red	
Turn signal indicator lights		12V-1.4W	2	Green	
Generator indicator light		12V-1.4W	1	Red	
4 wheel drive indicator light		12V-1.4W	1	Green	
Check engine indicator light		12V-1.4W	1	Red	California model only
Speedometer lights		12V-3.4W	2		
Combination meter lights		12V-3.4W	2		
Tachometer lights		12V-3.4W	2		
Submeter lights		12V-3.4W	3		
Heater control illumination light		12V-1.4W	2	Blue	
Low fuel level warning light		12V-3.4W	1	Yellow	

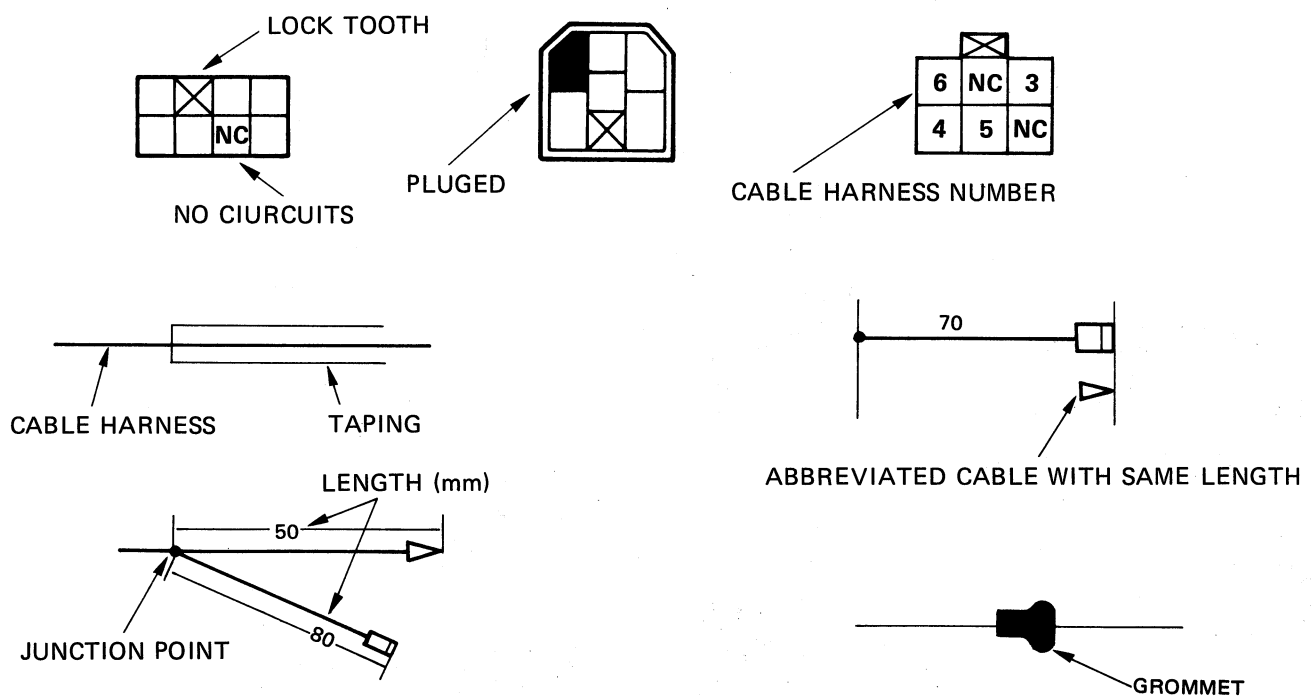
WIRING

SYMBOLS AND ABBEVIATIONS USED IN WIRING DIAGRAM

CONNECTORS

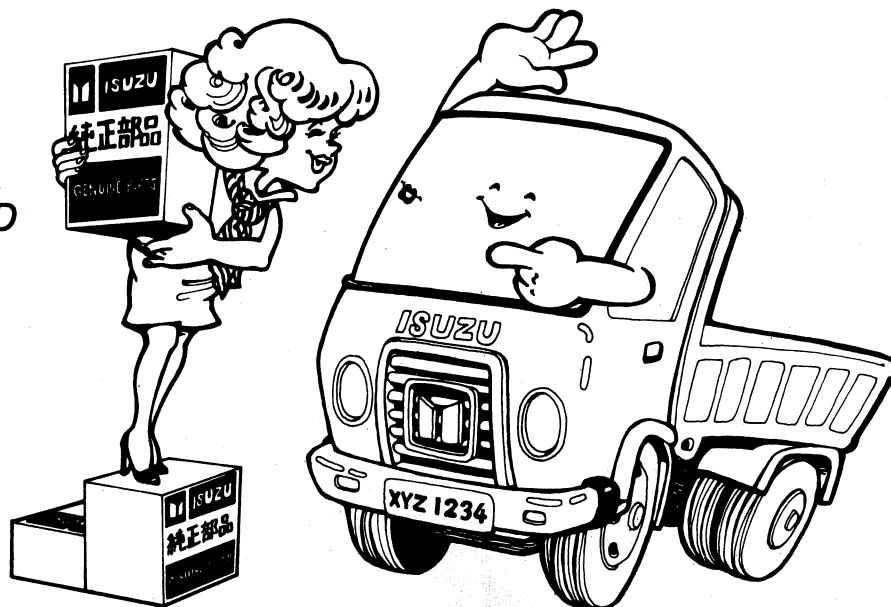
MAIL	FEMAIL	TYPE
		Jack type
		Slit type (Oil pressure switch etc.)
		Lock type
		Lock-less type
		Water proof type

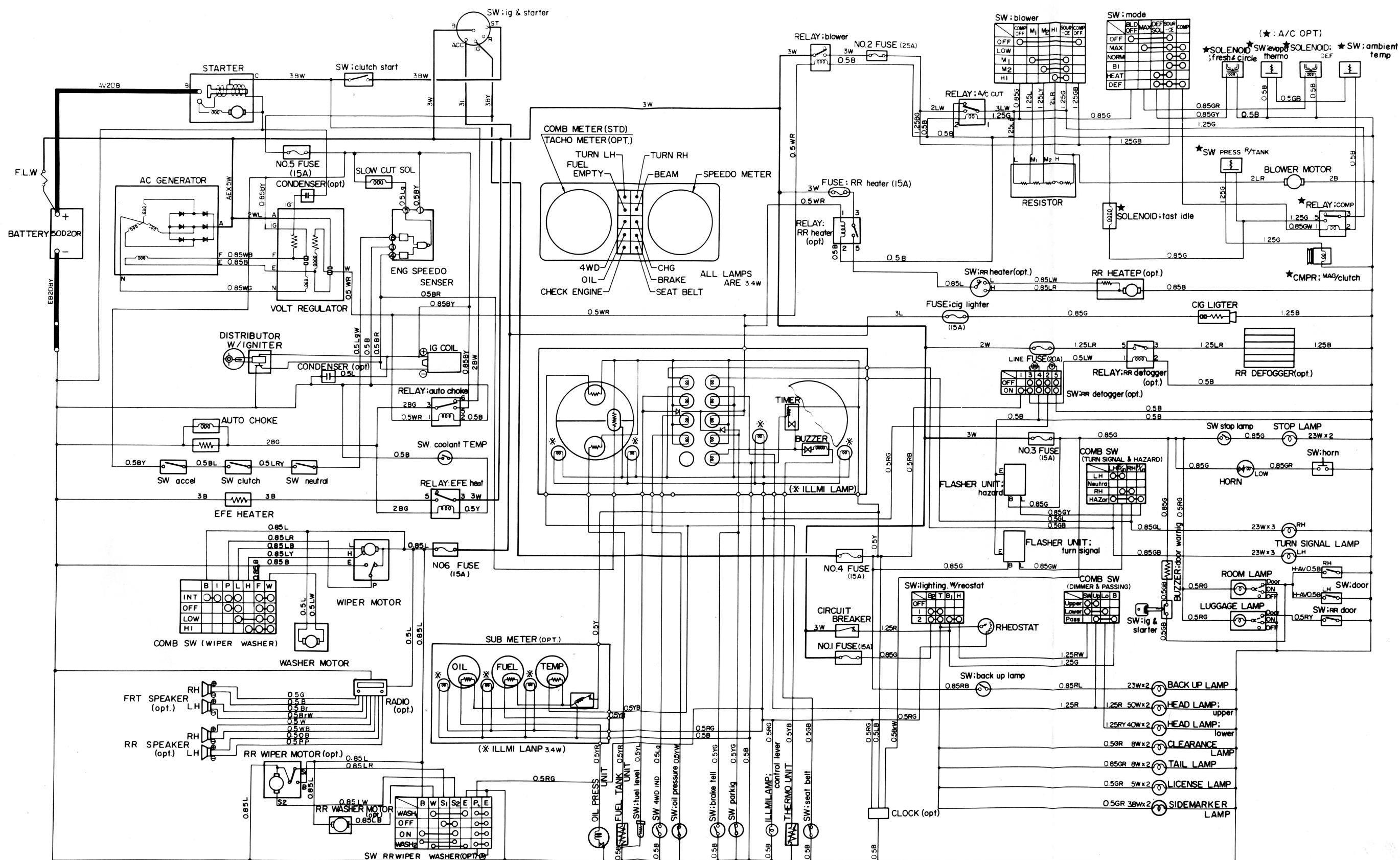
DESCRIPTION



MEMO

***PARTES DE CALIDAD
EN LAS CUALES
PUEDE CONFIAR***







NOTE: (A) (B) (C) (D) (E) (H) INDICATES A CONNECTION TO ANOTHER CABLE HARNESS

BODY CABLE HARNESS (FEDERAL) No. 2**Terminal connection position**

Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	5	W	Fusible link connection	AC. generator	(B)
2	3	W	Joint to No. 1	Fuse box (B)	Fuse (1)
3	3	W	Joint to No. 1	Switch ; ST (B)	
4					
5	3	BW	Switch ; clutch ST	Switch ; ST (ST)	
6	3	BW	Switch ; clutch ST	Starter C connection	
7					
8	0.85	BY	Fuse box (5)	V regulator (IG)	
9	3	W	Joint to No. 1	V regulator (B)	
10	0.65	WB	AC generator	V regulator (F)	
11	0.85	WG	AC generator	V regulator (N)	
12	0.85	BY	Joint to No. 8	Ignition coil (+)	
13	3	W	Fuse box (3)	Joint to No. 2	Fuse (B)
14	3	BY	Fuse box (IG)	Switch ; ST (IG)	
15	3	L	Fuse box (ACC)	Switch ; ST (ACC)	
16	2	BG	Carburetor	Relay ; Auto/choke	
17	05	WR	Joint to No. 64	Relay ; Auto/choke	Auto/choke
18	0.85	BY	Joint to No. 8	Relay ; Auto/choke	Coil (B)
19	2	BW	Joint to No. 6	Relay ; Auto/choke	Ignition (B)
20	0.85	BY	Joint to No. 8	Carburator	Starter switch (B)
21					Slow cut
22	3	W	Joint to No. 3	Circuit breaker	
23	1.25	R	Switch ; lighting	Circuit breaker	
24	1.25	RW	Switch ; lighting	Switch ; combination	
25	1.25	R	Head lamp ; LH	Switch ; combination	Upper
26	1.25	RY	Head lamp ; LH	Switch ; combination	Lower
27	2	R	Joint to No. 25	Head lamp ; RH	
28	2	RY	Joint to No. 26	Head lamp ; RH	
29	1.25	R	Joint to No. 25	Combination meter	Pilot light ; beam
30	0.85	GW	Fuse box (1)	Switch ; lighting	
31	0.85	GR	Chassis harness connection	Switch ; lighting	
32	0.5	GR	Combination L ; FR, LH	Combination L ; FR, RH	
33	0.5	GR	Combination L ; FR, LH	Joint to No. 31	
34	0.5	RG	Switch ; lighting	Combination meter	Illumination light
35	0.5	RG	Joint to No. 34	Sub meter	Illumination light
36	0.85	G	Fuse box (3)	Switch ; stop lamp	
37	0.85	G	Chassis harness connection	Switch ; stop lamp	
38	0.85	G	Joint to No. 36	Flasher/unit ; hazard (B)	

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Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
39	0.85	GY	Switch ; combination	Flasher/unit ; hazard (L)	
40	0.85	G	Joint to No. 36	Horn ; low	
41	0.85	GR	Switch ; combination	Horn ; low	
42	0.5	BrW	Joint to No. 135	Clock harness connection	(B)
43	0.5	RG	Joint to No. 35	Clock harness connection	Illumination light
44	0.5	RG	Joint to No. 36	Room L/H connection	
45	0.5	Y	Joint to No. 46	Combination meter	(B)
46	0.85	RB	Fuse box (4)	Mission/harness connection	Fuse 4
47	0.85	RL	Chassis harness connection	Mission/harness connection	Backup light
48	0.85	G	Joint to No. 46	Flasher/unit ; turn (B)	
49	0.85	GW	Switch ; combination	Flasher/unit ; turn (L)	
50	0.85	GL	Switch ; combination	Chassis harness connection	Turn signal RH
51	0.5	GL	Joint to No. 50	Combination L ; FR, RH	
52	0.5	GL	Joint to No. 50	Combination meter	Pilot light ; turn
53	0.85	GB	Switch ; combination	Chassis harness connection	Turn signal LH
54	0.5	GB	Joint to No. 53	Combination L ; FR, LH	
55	0.5	GB	Joint to No. 53	Combination meter	Pilot light ; turn
56	0.5	Y	Joint to No. 46	Combination meter	(B)
57	0.5	YR	Chassis harness connection	Combination meter	Fuel meter
58	0.5	YB	Engine harness connection	Combination meter	Thermo meter
59	0.5	YW	Engine harness connection	Combination meter	Pilot light ; oil P
60	0.5	YG	Switch ; parking	Joint to No. 61	Pilot light ; brake
61	0.5	YG	Combination meter	Switch ; brake oil	Pilot light ; brake
62	0.5	Lg	Mission/harness connection	Combination meter	Pilot light ; 4WD
63	0.5	L	Joint to No. 12	Condenser	
64	0.5	WR	V regu (W)	Combination meter	Pilot light ; charge
65	0.5	RG	Joint to 34	Combination meter	Illumination light
66	0.5	YL	Chassis harness connection	Combination meter	Pilot light ; empty
67	0.85	L	Fuse box (6)	Wiper motor	
68	0.85	LR	Switch ; combination	Wiper motor	Auto/stop
69	0.85	LB	Switch ; combination	Wiper motor	Low
70	0.85	LY	Switch ; combination	Wiper motor	High
71	0.5	LW	Switch ; combination	Washer tank	
72	0.5	L	Joint to No. 67	Washer tank	
73	0.85	L	Joint to No. 67	Switch ; combination	Wiper (B)
74	3	W	Joint to No. 2	Relay ; blower	A/C (B)
75	2	LW	Fuse box (2)	Relay ; A/C cut	(3)
76	0.5	WR	Relay ; blower	Joint to No. 64	
77	3	L	Joint to No. 15	Fuse holder	Cigar light
78	0.85	G	Cigar lighter	Fuse holder	
79	1.25	L	Switch ; blower	Resistor	M1

Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
80	1.25	LY	Switch ; blower	Resistor	M2
81	2	LR	Switch ; blower	Resistor	Hight
82	2	LR	Blower Motor	Joint to No. 81	
83	1.25	G	Joint to No. 221	Relay ; comp (3)	A/C oil
84	1.25	G	Relay ; comp (5)	Switch ; press. R/TA	
85	0.5	RG	Joint to No. 35	Illumination light ; rheostat	
86	1.25	G	Enging harness connection	Switch ; press. R/TA	Magnetic clutch
87					
88	0.5	Lg	Carburetor	Engine SP sensor	(5)
89	0.5	BY	Joint to No. 20	Engine SP sensor	(1)
90	0.5	LgW	Mission harness connection	Engine SP sensor	(6)
91	0.5	LgY	Mission harness connection	Switch ; clutch	
92	0.5	BL	Switch ; accel	Switch ; clutch	
93	0.5	BY	Switch ; accel	Joint to No. 20	
94	0.5	BR	Ign coil (—)	Engine SP sensor	(4)
95					
96					
97	2	BG	Joint to No. 16	Relay ; efe H (1)	
98	0.5	Y	Engine harness connection	Relay ; efe H (2)	Switch temperature switch
99	3	W	Joint to No. 1	Relay ; efe H (3)	
100	3	R	Efe heater	Relay ; efe H (5)	
101	0.85	GY	Switch ; model	Sol ; fresh & cir	
102	0.85	GR	Switch ; model	Sol ; def. door	
103	1.25	GB	Switch ; model	Joint to No. 75	Mode switch (B)
104	0.85	GW	Switch ; model	Relay ; comp (1)	(B)
105	0.85	G	Switch ; blower	Joint to No. 138	
106	0.85	LB	Resistor	Joint to No. 221	Low
107					
108	0.5	BR	Combination meter	Joint to No. 94	Tacho meter
109	0.5	YR	Joint to No. 57	Sub meter	Fuel meter
110	0.5	YB	Joint to No. 58	Sub meter	Thermo meter
111	3	W	Fuse box (B)	Relay ; blower	Fuse (2)
112					
113					
114					
115	1.25	G	Joint to No. 23	Switch ; combination	Passing
116	0.5	Y	Joint to No. 46	Sub meter	(B)
117	1.25	GB	Switch ; blower	Joint to No. 103	
118	0.5	L	Joint to No. 67	Radio	
119	0.5	Br	Speaker ; LH	Radio	(+)
120	0.5	Br	Speaker ; LH	Radio	(—)

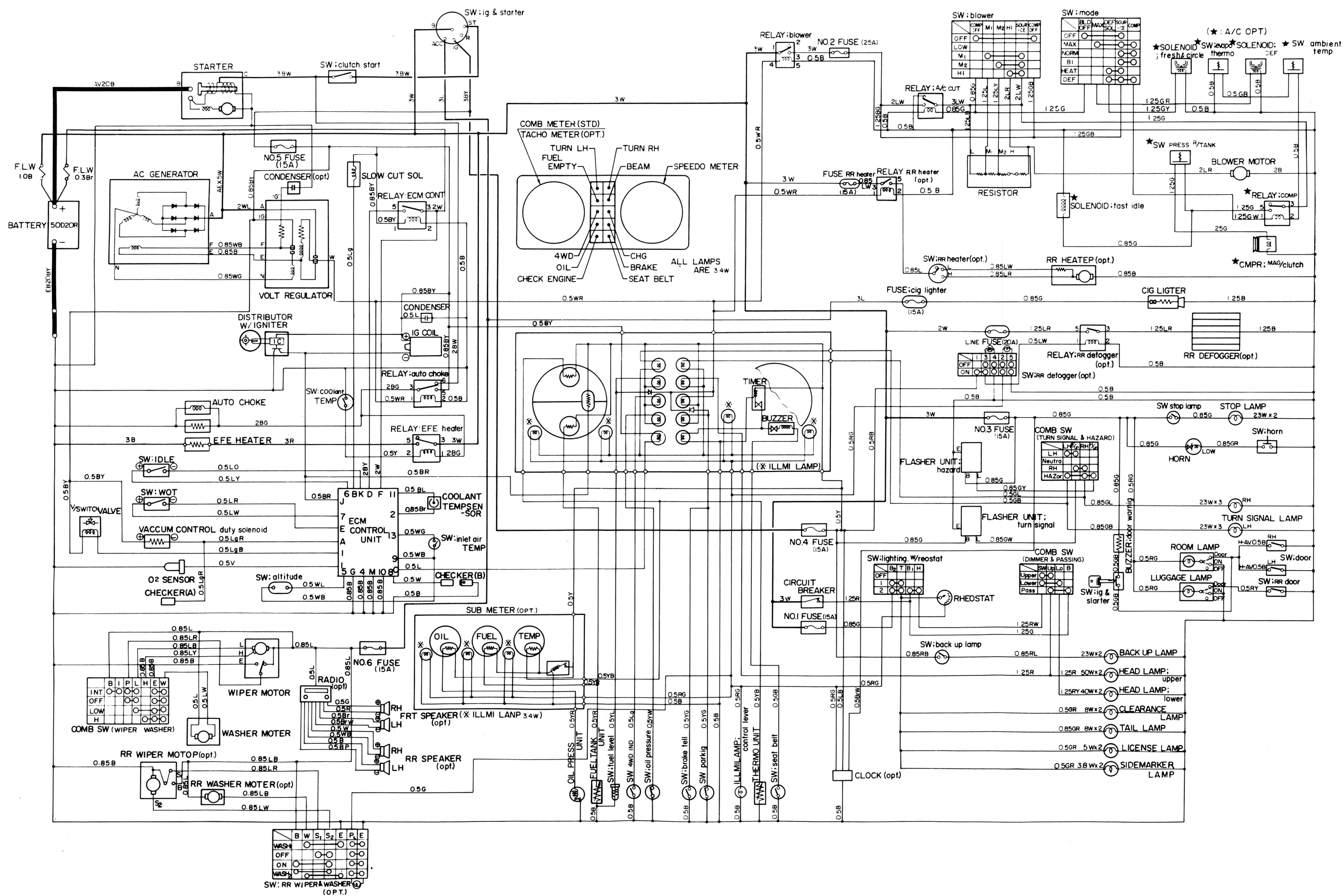
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Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
121	0.5	G	Speaker ; RH	Radio	(+)
122	0.5	R	Speaker ; RH	Radio	(—)
123	0.5	WR	Joint to No. 64	Relay ; RR heat	Coil (B)
124	0.85	LW	Fuse holder	Relay ; RR heat	(B)
125	3	W	Fuse holder	Joint to No. 2	
126	0.85	L	Relay ; RR heat	Switch RR heater	
127	0.85	LW	RR heat harness connection	Switch RR heater	Low
128	0.85	LR	RR heat harness connection	Switch RR heater	High
129	0.5	Y	Joint to No. 46	Combination meter	Seatbelt timer (B)
130	0.85	L	Joint to No. 67	Switch ; RR wiper	
131	0.85	LW	Chassis harness connection	Switch ; RR wiper	
132	0.85	LR	Chassis harness connection	Switch ; RR wiper	
133	0.85	LB	Chassis harness connection	Switch ; RR wiper	RR washer
134	0.85	L	Chassis harness connection	Joint to No. 67	
135	0.85	G	Joint to No. 36	Buzzer DR warn	
136	0.5	GB	Switch ; stator	Buzzer DR warn	
137	0.85	G	Joint to No. 84	Sol ; idle cont	
138	1.25	G	Switch ; mode	Relay ; A/C cut	
139	0.5	RY	Chassis harness connection	Room L/H connection	RR/Door switch
140	0.5	GB	Relay ; comp (2)	Sensor ; A/temp	
141	0.5	GB	Switch ; therm evarp	Sensor ; A/temp	
142	0.5	GB	Combination meter	Switch ; seat belt	
143	0.5	GB	Switch ; ST	Room L/H connection	
144	3	W	Joint to No. 3	Fuse holder	RR defog
145	1.25	LR	Relay ; RR defog	Fuse holder	RR defog
146	1.25	LR	Relay ; RR defog	Chassis harness connection	
147	0.5	LW	Relay ; RR defog	Switch ; RR defog	
148	0.5	BY	Joint to No. 46	Switch ; RR defog	
149	0.5	YL	Engine harness connection	Sub meter	Unit ; O/PR
150					
151					
152					
153					
154					
155					
156					
157					
158					
159					
160	0.5	LB	Joint to No. 46	Clock harness connection	Ignition (B)
161					

Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
162					
163	0.5	W	Radio	Room L/H co	RR speaker R (+)
164	0.5	OB	Radio	Room L/M co	RR speaker L (+)
165	0.5	BG	Combination meter	Combination meter	Pilot light ; seatbelt
166	0.5	WB	Radio	Room L/H co	RR speaker R (—)
167	0.5	RG	Joint to No. 34	Switch ; RR defog	Illumination light
168	0.5	BP	Radio	Room L/H co	RR speaker L (—)
169					
170	2	B	Earth ; B/Fix, LH	Head lamp ; RH	Earth
171	1.25	B	Joint to No. 170	Head lamp ; LH	Earth
172	0.5	B	Joint to No. 170	Combination L ; FR RH	Earth
173	0.5	B	Joint to No. 170	Combination L ; FR LH	Earth
174	3	B	Earth ; B/Fix, LH	Efe heater	Earth
175					
176					
177	0.5	B	Joint to No. 170	Relay ; Blower	Earth
178					
179	0.85	B	Joint to No. 186	Switch ; combination	Earth
180	0.5	B	Joint to No. 186	Relay ; A/C cut	Earth
181	0.5	B	Joint to No. 186	Engine SP sensor	Earth
182	0.5	B	Joint to No. 186	Combination meter	Earth
183	0.5	B	Joint to No. 186	Combination meter	Earth
184	0.5	B	Joint to No. 186	Combination meter	Earth
185	0.5	B	Joint to No. 186	Switch ; RR degof	Earth
186	0.85	B	Joint to No. 205	Relay ; RR defog	Earth
187	0.5	B	Joint to No. 177	Relay ; A/Choke	Earth
188	0.5	B	Joint to No. 186	Switch ; seat belt	Earth
189	0.5	B	Joint to No. 186	AC cut/relay	Earth
190					
191	0.5	B	Joint to No. 186	Switch ; RR defog	Earth
192					
193					
194	0.5	B	Joint to No. 186	F/unit ; haz (E)	
195	0.5	B	Joint to No. 186	F/unit ; turn (E)	
196	0.5	B	Joint to No. 177	Switch ; brake oil	Earth
197	0.85	B	AC gene (E)	V. regu (E)	Earth
198					
199					
200	2	B	Earth ; B/Fix, RH	Blower mo	Earth
201	0.85	B	Joint to No. 205	Wiper motor	Earth
202	0.5	B	Joint to No. 200	Relay ; RR heat	Earth

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Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
203	0.5	B	Joint to No. 205	Mission/harness connection	Earth
204					
205	1.25	B	Earth ; B/Fix, RH	Cigar lighter	Earth
206	0.85	B	Joint to No. 205	Switch ; RR wiper	Earth
207					
208	0.5	B	Joint to No. 205	Sub meter	Earth
209	0.5	B	Joint to No. 205	Illmi L ; H/Cot	Earth
210					
211					
212					
213					
214	0.5	B	Joint to No. 200	Sol ; fresh & cir	Earth
215	0.5	B	Joint to No. 214	Sol ; def door	Earth
216	0.5	B	Joint to No. 215	Switch ; therm evapo	Earth
217	0.85	B	Joint to No. 200	RR heat harness connection	Earth
218					
219					
220	0.5	B	Joint to No. 186	Clock harness connection	Earth
221	2	LW	Switch ; blower	Relay ; A/C cut	
222					
223	0.5	RG	Joint to No. 35	Switch ; RR wiper	Illumination light
224					
225					
226					
227	0.5	R	Radio	Radio	FR speaker (—)





NOTE: (A) (B) (C) (D) (E) (H) INDICATE A CONNECTION TO ANOTHER CABLE HARNESS

BODY CABLE HARNESS (CALIFORNIA) No. 2

Terminal connection position

Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	5	W	Fusible link connection	AC. generator	(B)
2	3	W	Joint to No. 1	Fuse box (B)	Fuse (1)
3	3	W	Joint to No. 1	Switch ; starter (B)	
4					
5	3	BW	Switch ; clutch ST	Switch ; starter (ST)	
6	3	BW	Switch ; clutch ST	Starter C connection	
7	2	W	Fusible link connection	Relay ; C/unit (3)	E/Cont (B)
8	0.85	BY	Fuse box (5)	V regulator (IG)	
9	3	W	Joint to No. 1	V regulator (B)	
10	0.85	WB	AC generator	V regulator (F)	
11	0.85	WG	AC generator	V regulator (N)	
12	0.85	BY	Joint to No. 8	Ignition coil (+)	
13	3	W	Fuse box (B)	Joint to No. 2	Fuse (3)
14	3	BY	Fuse box (IG)	Switch ; starter (IG)	
15	3	L	Fuse box (ACC)	Switch ; starter (ACC)	
16	2	BG	Carburator	Relay ; Auto/choke	Auto/choke
17	0.5	WR	Joint to No. 64	Relay ; Auto/choke	Coil (B)
18	0.85	BY	Joint to No. 8	Relay ; Auto/choke	Ignition (B)
19	2	BW	Joint to No. 6	Relay ; Auto/choke	Starter switch (B)
20	0.85	BY	Joint to No. 8	Carburator	Slow cut
21					
22	2	W	Joint to No. 3	Circuit breaker	
23	1.25	R	Switch ; lighting	Circuit breaker	
24	1.25	RW	Switch ; lighting	Switch ; combination	
25	1.25	R	Head lamp ; LH	Switch ; combination	Upper
26	1.25	RY	Head lamp ; LH	Switch ; combination	Lower
27	2	R	Joint to No. 25	Head lamp ; RH	
28	2	RY	Joint to No. 26	Head lamp ; RH	
29	1.25	R	Joint to No. 25	Combination meter	Pilot light ; beam
30	0.85	GW	Fuse box (1)	Switch ; lighting	
31	0.85	GR	Chassis H connection	Switch ; lighting	Tail. light
32	0.5	GR	Combination L ; FR, LH	Combination L ; FR, RH	Clearance light
33	0.5	GR	Combination L ; FR, LH	Joint to No. 31	
34	0.5	RG	Switch ; lighting	Combination meter	Illumination light
35	0.5	RG	Joint to No. 34	Sub meter	Illumination light
36	0.85	G	Fuse box (3)	Switch ; stop lamp	
37	0.85	G	Chassis H Connection	Switch ; stop lamp	
38	0.85	G	Joint to No. 36	Flasher/unit ; hazard (B)	

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Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
39	0.85	GY	Switch ; combination	Flasher/Unit ; hazard (L)	
40	0.85	G	Joint to No. 36	Horn ; low	
41	0.85	GR	Switch ; combination	Horn ; low	
42	0.5	BrW	Joint to No. 135	Clock harness connection	(B)
43	0.5	RG	Joint to No. 35	Clock harness connection	Illumination light
44	0.5	RG	Joint to No. 36	Room L/H connection	
45	0.5	Y	Joint to No. 46	Combination meter	(B)
46	0.85	RB	Fuse box (4)	Mission/harness connection	Fuse (IG)
47	0.85	RL	Chassis harness connection	Mission/harness connection	Backup light
48	0.85	G	Joint to No. 46	Flasher/Unit ; turn (B)	
49	0.85	GW	Switch ; combination	Flasher/Unit ; turn (L)	
50	0.85	GL	Switch ; combination	Chassis harness connection	T/S RH
51	0.5	GL	Joint to No. 50	Combination L ; FR, RH	
52	0.5	GL	Joint to No. 50	Combination meter	Pilot light ; turn
53	0.85	GB	Switch ; combination	Chassis harness connection	Turn signal LH
54	0.5	GB	Joint to No. 53	Combination L ; FR. LH	
55	0.5	GB	Joint to No. 53	Combination meter	Pilot light ; turn
56	0.5	Y	Joint to No. 46	Combination meter	(B)
57	0.5	YR	Chassis harness connection	Combination meter	Fuel meter
58	0.5	YB	Engine harness connection	Combination meter	Thermo meter
59	0.5	YW	Engine harness connection	Combination meter	Pilot light ; oil P
60	0.5	YG	Switch ; parking	Joint to No. 61	Pilot light ; brake
61	0.5	YG	Combination meter	Switch ; brake oil	Pilot light ; brake
62	0.5	Lg	Mission/harness connection	Combination meter	Pilot light ; 4WD
63	0.5	L	Joint to No. 12	Condenser	
64	0.5	WR	V regu (W)	Combination meter	Pilot light ; charge
65	0.5	RG	Joint to 34	Combination meter	Illumination light
66	0.5	YL	Chassis harness connection	Combination meter	Pilot light ; F/emp
67	0.85	L	Fuse box (6)	Wiper motor	
68	0.85	LR	Switch ; combination	Wiper motor	Auto/stop
69	0.85	LB	Switch ; combination	Wiper motor	Low
70	0.85	LY	Switch ; combination	Wiper motor	High
71	0.5	LW	Switch ; combination	Washer tank	
72	0.5	L	Joint to No. 67	Washer tank	
73	0.85	L	Joint to No. 67	Switch ; combination	Wiper (B)
74	3	W	Joint to No. 2	Relay ; blower	A/C (B)
75	2	LW	Fuse box (2)	Relay ; A/C cut	(3)
76	0.5	WR	Relay ; blower	Joint to No. 64	
77	3	L	Joint to No. 15	Fuse holder	Cigar light
78	0.85	G	Cigar lighter	Fuse holder	
79	1.25	L	Switch ; blower	Resistor	M1

Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
80	1.25	LY	Switch ; blower	Resistor	M2
81	2	LR	Switch ; blower	Resistor	Hight
82	2	LR	Blower Motor	Joint to No. 81	
83	1.25	G	Joint to No. 221	Relay ; comp (3)	A/C
84	1.25	G	Relay ; comp (5)	Switch ; press. R/TA	
85	0.5	RG	Joint to No. 35	Illumination light ; rheostat	
86	1.25	G	Enging harness connection	Switch ; press. R/TA	Mag clutch
87	0.5	LgR	Vacuum cont	Ecm control unit (A)	Solenoid ; duty
88	0.5	Lg	Carburator	Ecm control unit (B)	Slow cut
89	0.5	L	Combination meter	Ecm control unit (C)	Pilot light ; engine C
90	2	BY	Relay ; C/unit (5)	Ecm control unit (D)	
91	0.5	LR	Vacuum switch	Ecm control unit (E)	Wot. S (—)
92	2	W	Joint to No. 7	Ecm control unit (F)	
93	0.5	LgB	V.S.V ; air	Ecm control unit (I)	
94	0.5	BR	Ign coil (—)	Ecm control unit (J)	
95	0.5	LO	Vacuum switch	Ecm control unit (K)	Idle. switch (—)
96	0.5	BY	Joint to No. 20	Relay ; C/unit (1)	
97	2	BG	Joint to No. 16	Relay ; efe heater (1)	
98	0.5	Y	Engine harness connection	Relay ; efe heater (2)	Switch/Temp. Switch
99	3	W	Joint to No. 1	Relay ; efe heater (3)	
100	3	R	Efe heater	Relay ; efe heater (5)	
101	1.25	GY	Switch ; mode	Solenoid ; fresh & air	
102	1.25	GR	Switch ; mode	Solenoid ; def. door	
103	1.25	GB	Switch ; mode	Joint to No. 75	Mode switch (B)
104	1.25	GW	Switch ; mode	Relay ; comp (1)	(B)
105	1.25	G	Switch ; blower	Joint to No. 138	
106	1.25	LW	Resistor	Joint to No. 221	Low
107	0.5	BY	Combination meter	Joint to No. 20	Choke engine (B)
108	0.5	BR	Combination meter	Joint to No. 94	Tacho meter
109	0.5	YR	Joint to No. 57	Sub meter	Fuel meter
110	0.5	YB	Joint to No. 58	Sub meter	Thermo meter
111	3	LW	Fuse box (B)	Relay ; blower	Fuse (2)
112	0.5	BY	Joint to No. 8	V.S.V	
113	0.5	BY	Joint to No. 20	Vacuum cont	Solenoid ; duty
114	0.5	LgR	Joint to No. 87	Checker (A)	
115	1.25	G	Joint to No. 23	Switch ; combination	Passing
116	0.5	Y	Joint to No. 46	Sub meter	(B)
117	1.25	GB	Switch ; blower	Joint to No. 103	
118	0.5	L	Joint to No. 67	Radio	
119	0.5	Br	Speaker ; LH	Radio	(+)
120	0.5	BrW	Speaker ; LH	Radio	(—)

04—64 ELECTRICALS

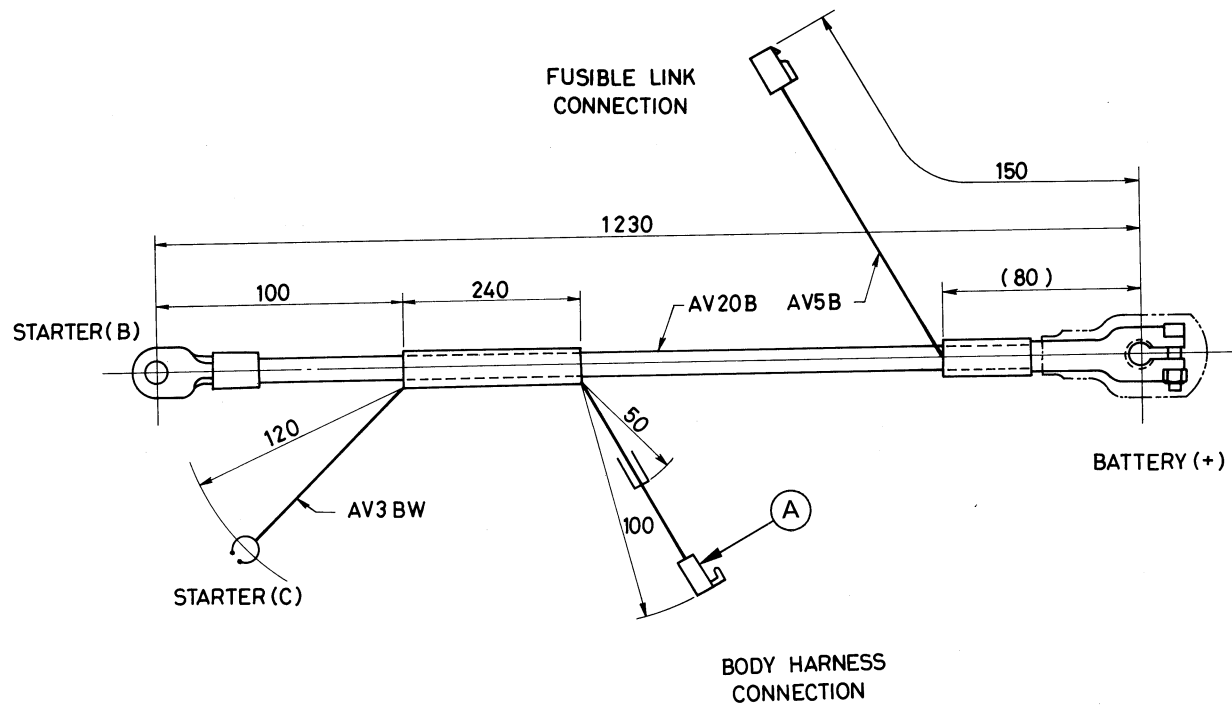
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
121	0.5	G	Speaker ; RH	Radio	(+)
122	0.5	R	Speaker ; RH	Radio	(—)
123	0.5	WR	Joint to No. 64	Relay ; RR heat	Coil (B)
124	0.85	LW	Fuse holder	Relay ; RR heat	(B)
125	3	W	Fuse holder	Joint to No. 2	
126	0.85	L	Relay ; RR heat	Switch RR heater	
127	0.85	LW	RR heat harness connection	Switch RR heater	Low
128	0.85	LR	RR heat harness connection	Switch RR heater	High
129	0.5	Y	Joint to No. 46	Combination meter	Seatbelt timer (B)
130	0.85	L	Joint to No. 67	Switch ; RR wiper	
131	0.85	LW	Chassis harness connection	Switch ; RR wiper	
132	0.85	LR	Chassis harness connection	Switch ; RR wiper	
133	0.85	LB	Chassis harness connection	Switch ; RR wiper	RR washer
134	0.85	L	Chassis harness connection	Joint to No. 67	
135	0.85	G	Joint to No. 36	Buzzer Door warning	
136	0.5	GB	Switch ; starter	Buzzer Door warning	
137	0.85	G	Joint to No. 84	Sol ; idle cont	
138	0.85	G	Switch ; mode	Relay ; A/C cut	
139	0.5	RY	Chassis harness connection	Room light harness connection	RR/Door switch
140	0.5	GB	Relay ; A/C comp	Sensor ; Ambient temperature	
141	0.5	GB	Switch ; therm evapo	Sensor ; Ambient temperature	
142	0.5	GB	Combination meter	Switch ; seat belt	
143	0.5	GB	Switch ; starter	Room L/H connection	
144	3	W	Joint to No. 3	Fuse holder	RR defogger
145	1.25	LR	Relay ; RR defog	Fuse holder	RR defogger
146	1.25	LR	Relay ; RR defog	Chassis harness connection	
147	0.5	LW	Relay ; RR defog	Switch ; RR defog	
148	0.5	BY	Joint to No. 46	Switch ; RR defog	
149	0.5	YL	Engine harness connection	Sub meter	Unit ; Oil pressure
150	0.5	V	O2 sensor	Ecm c/unit (1)	
151	0.85	Br	Engine harness connection	Ecm c/unit (2)	Coolant temperature sensor (+)
152	0.5	WL	Alt switch	Ecm c/unit (5)	(+)
153	0.5	LY	Vacuum switch	Ecm c/unit (6)	Idling switch S (+)
154	0.5	LW	Vacuum switch	Ecm c/unit (7)	W.O.T. switch (+)
155	0.5	W	Checker (B)	Ecm c/unit (8)	
156	0.5	WB	Inlet T/sensor	Ecm c/unit (9)	
157	0.5	BL	Engine harness connection	Ecm c/unit (11)	Coolant temperature sensor (—)
158	0.5	WG	Inlet T/sensor	Ecm c/unit (13)	
159	0.5	WB	Joint to No. 156	Alt switch	(—)
160	0.5	LB	Joint to No. 46	Clock harness connection	Ignition (B)
161					

Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
162					
163	0.5	W	Radio	Room light harness connection	RR Speaker R (+)
164	0.5	OB	Radio	Room light harness connection	RR Speaker L (+)
165	0.5	BG	Combination meter	Combination meter	Pilot light ; seatbelt
166	0.5	WB	Radio	Room light harness connection	RR Speaker (—)
167	0.5	RG	Joint to No. 34	Switch ; RR defog	Illumination light
168	0.5	BP	Radio	Room light harness connection	RR speaker L (—)
169					
170	2	B	Earth ; B/Fix, LH	Head lamp ; RH	Earth
171	1.25	B	Joint to No. 170	Head lamp ; LH	Earth
172	0.5	B	Joint to No. 170	Combination light ; FR RH	Earth
173	0.5	B	Joint to No. 170	Combination light ; FR LH	Earth
174	3	B	Earth ; Body fixing LH	Efe heater	Earth
175					
176					
177	0.5	B	Joint to No. 170	Relay ; Blower	Earth
178					
179	0.85	B	Joint to No. 186	Switch ; Combination	Earth
180	0.5	B	Joint to No. 186	Relay ; A/C cut	Earth
181	0.5	B	Joint to No. 205	Relay ; Control/Unit	Earth
182	0.5	B	Joint to No. 186	Combination meter	Earth
183	0.5	B	Joint to No. 186	Combination meter	Earth
184	0.5	B	Joint to No. 186	Combination meter	Earth
185	0.5	B	Joint to No. 186	Switch ; RR degof	Earth
186	0.85	B	Joint to No. 205	Relay ; RR defog	Earth
187	0.5	B	Joint to No. 177	Relay ; A/Choke	Earth
188	0.5	B	Joint to No. 186	Switch ; seat belt	Earth
189	0.5	B	Joint to No. 186	A/C cut relay	Earth
190	0.5	B	Joint to No. 205	Checker (B)	Earth
191	0.5	B	Joint to No. 186	Switch ; RR defog	Earth
192					
193					
194	0.5	B	Joint to No. 186	Flasher ; hazard (E)	
195	0.5	B	Joint to No. 186	Flasher ; turn (E)	
196	0.5	B	Joint to No. 177	Switch ; brake oil	Earth
197	0.85	B	AC generator (E)	Voltage regulator (E)	Earth
198					
199					
200	2	B	Earth ; Body fixing RH	Blower motor	Earth
201	0.85	B	Joint to No. 205	Wiper motor	Earth
202	0.5	B	Joint to No. 200	Relay ; RR heat	Earth

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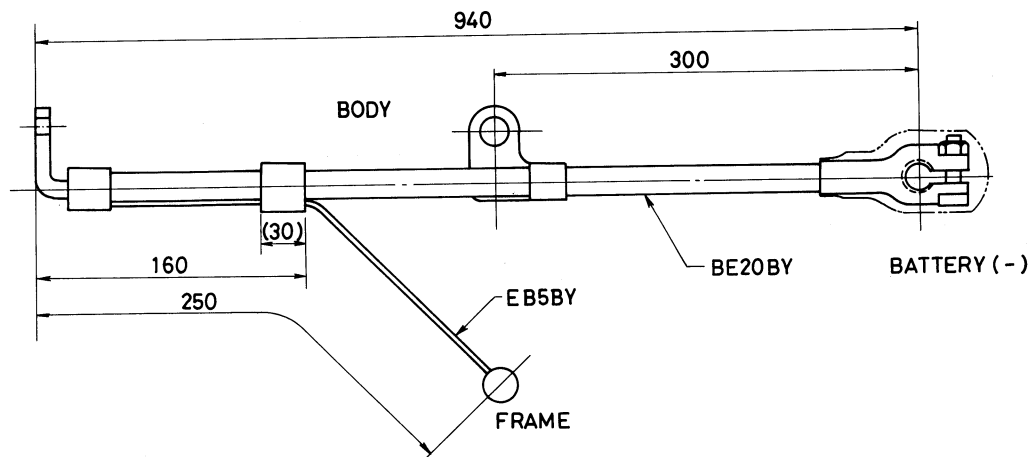
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
203	0.5	B	Joint to No. 205	Mission/harness connection	Earth
204					
205	1.25	B	Earth ; B/Fix, RH	Cigar lighter	Earth
206	0.85	B	Joint to No. 205	Switch ; RR wiper	Earth
207					
208	0.5	B	Joint to No. 205	Sub meter	Earth
209	0.5	B	Joint to No. 205	Illumination light ; H/Cot	Earth
210	0.85	B	Engine earth c/co	Ecm control/unit (G)	Earth
211	0.85	B	Engine earth c/co	Ecm control/unit (M)	Earth
212	0.85	B	Engine earth c/co	Ecm control/unit (4)	Earth
213	0.85	B	Engine earth c/co	Ecm control/unit (10)	Earth
214	0.5	B	Joint to No. 200	Solenoid ; fresh & cir	Earth
215	0.5	B	Joint to No. 214	Solenoid ; def door	Earth
216	0.5	B	Joint to No. 214	Switch ; therm evapo	Earth
217	0.85	B	Joint to No. 200	RR heat harness connection	Earth
218					
219					
220	0.5	B	Joint to No. 186	Clock harness connection	Earth
221	2	LW	Switch ; blower	Relay ; A/C cut	
222					
223	0.5	RG	Joint to No. 35	Switch ; RR wiper	Illumination light
224					
225					
226					
227	0.5	R	Radio	Radio	FR speaker (—)

BATTERY CABLE (+)

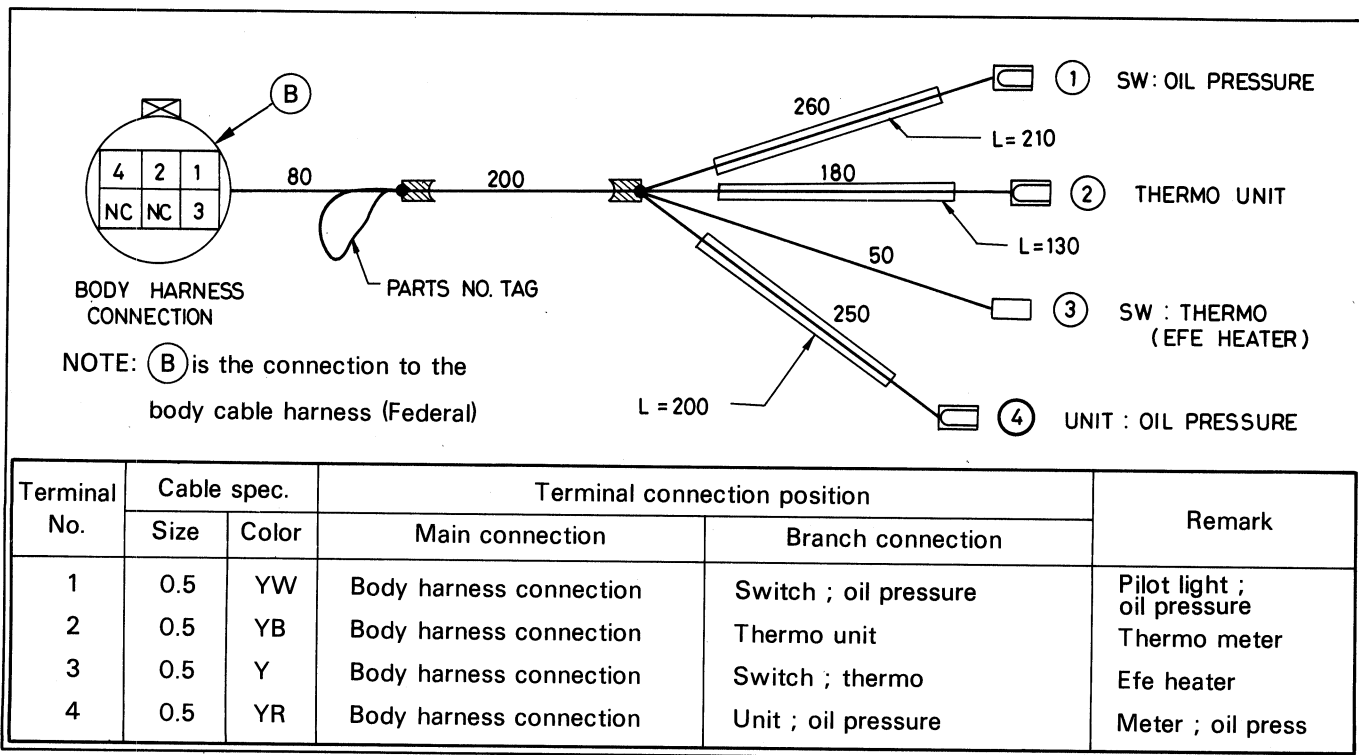


NOTE: (A) is the connection to the body cable harness

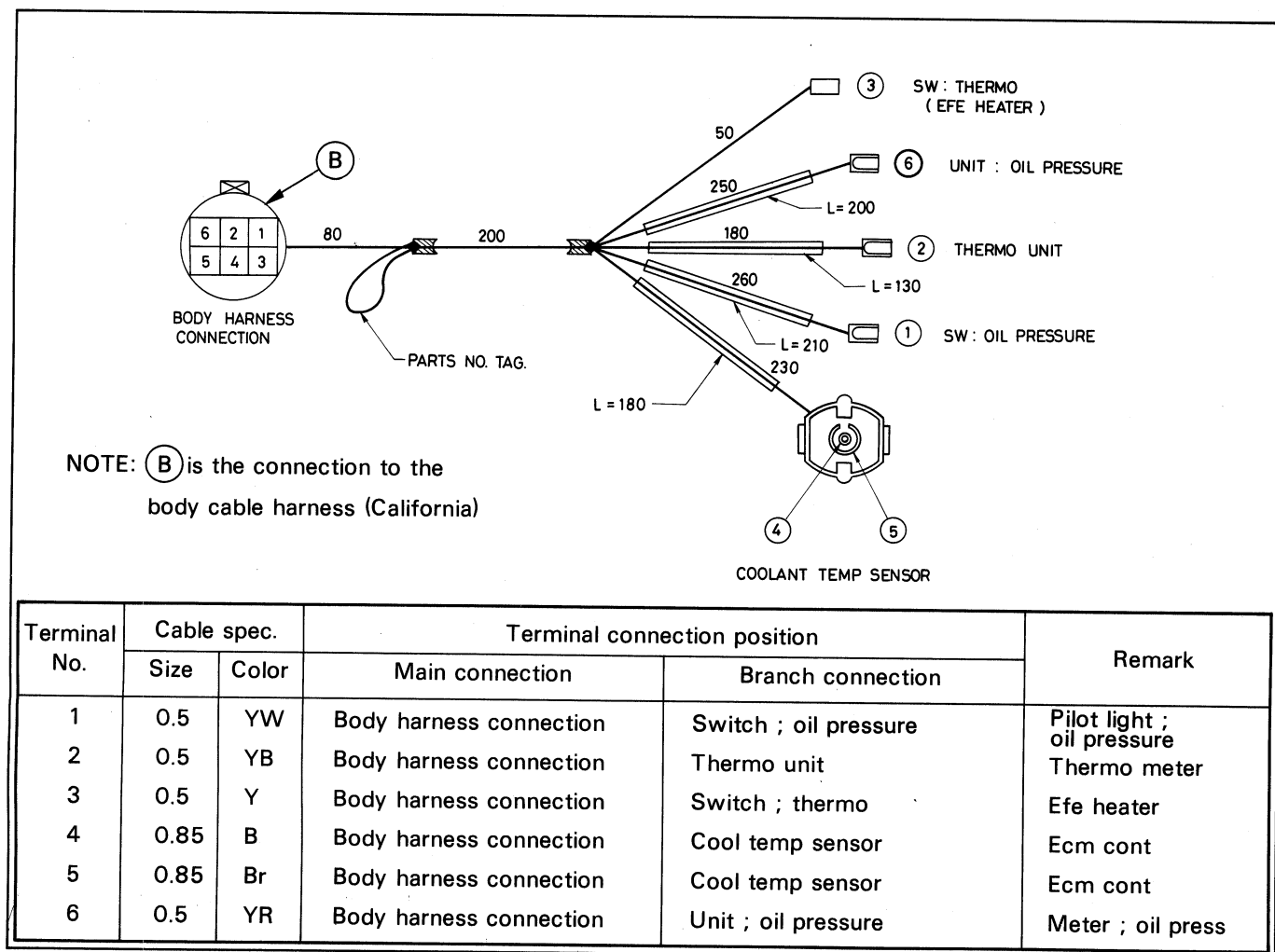
BATTERY CABLE (-)



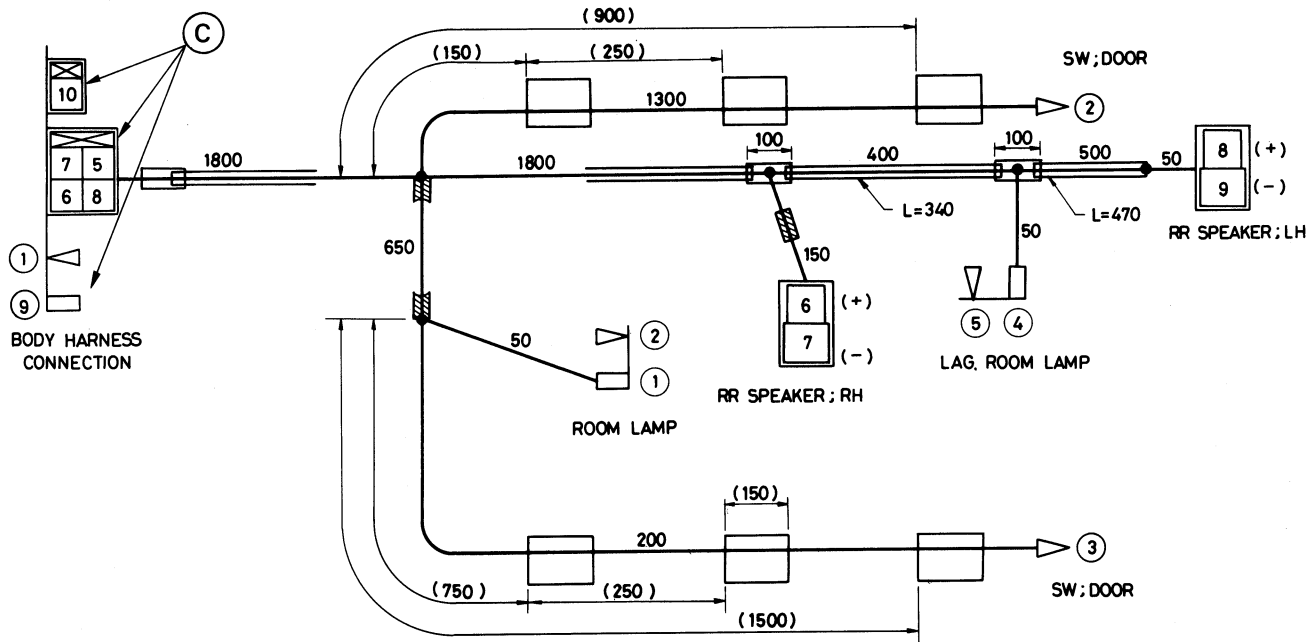
ENGINE CABLE HARNESS (FEDERAL)



ENGINE CABLE HARNESS (CALIFORNIA)



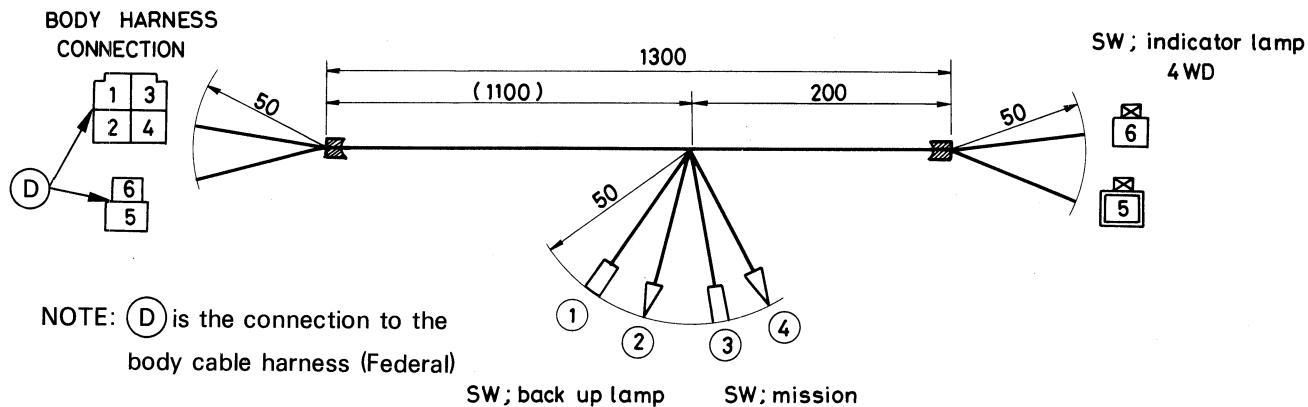
DOME LIGHT & REAR SPEAKER CABLE HARNESS



NOTE: (C) is the connection to the body cable harness

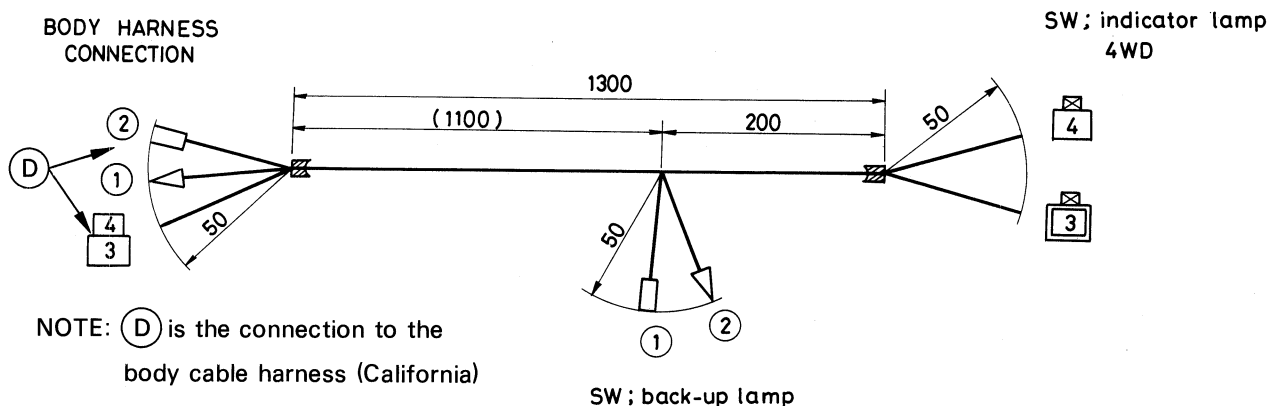
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	0.5	RG	Body harness connection	Room lamp	Lamp (B)
2	0.5	B	Switch ; door	Room lamp	
3	0.5	B	Switch ; door	Joint to No. 2	
4	0.5	RG	Joint to No. 1	Luggage room/lamp	Lamp (B)
5	0.5	RY	Body harness connection	Luggage room/lamp	To RR/Door switch
6	0.5	W	Body harness connection	RR speaker ; RH	(+)
7	0.5	WB	Body harness connection	RR speaker ; RH	(-)
8	0.5	OB	Body harness connection	RR speaker ; LH	(+)
9	0.5	BP	Body harness connection	RR speaker ; LH	(-)
10	0.5	GB	Body harness connection	Joint to No. 2	Door warning

TRANSMISSION CABLE HARNESS (FEDERAL)



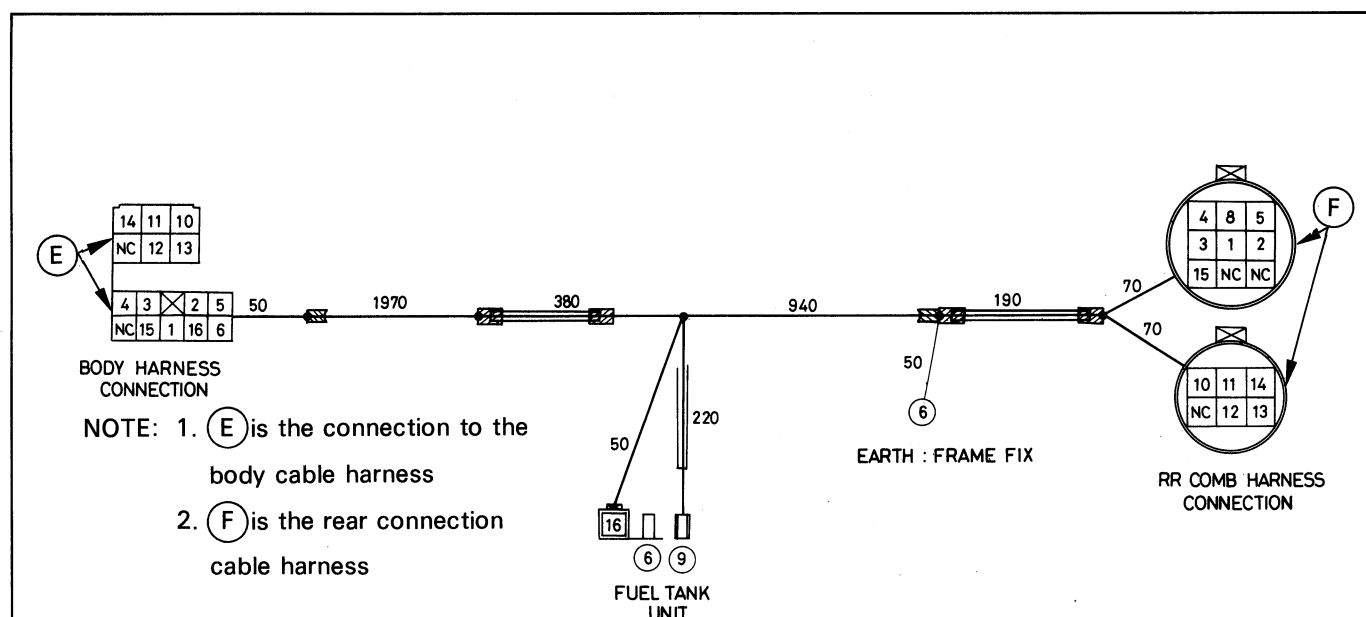
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	0.5	RB	Body harness connection	Back-up switch (Light)	(+) Light
2	0.5	RL	Body harness connection	Back-up switch (Light)	
3	0.5	LgY	Body harness connection	Transmission switch	
4	0.5	LgW	Body harness connection	Transmission switch	
5	0.5	Lg	Body harness connection	4WD indicator light switch	
6	0.5	B	Body harness connection	4WD indicator light switch	

TRANSMISSION CABLE HARNESS (CALIFORNIA)



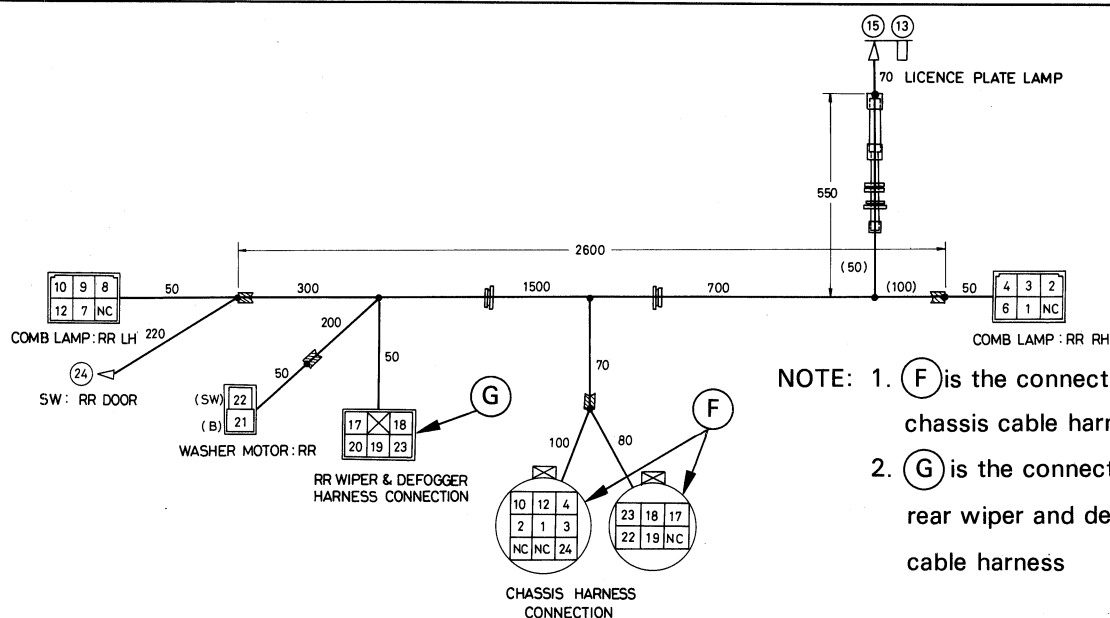
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	0.5	RB	Body harness connection	Back-up switch (Light)	(+) Light
2	0.5	RL	Body harness connection	Back-up switch (Light)	
3	0.5	Lg	Body harness connection	4WD indicator light switch	
4	0.5	B	Body harness connection	4WD indicator light switch	

CHASSIS CABLE HARNESS



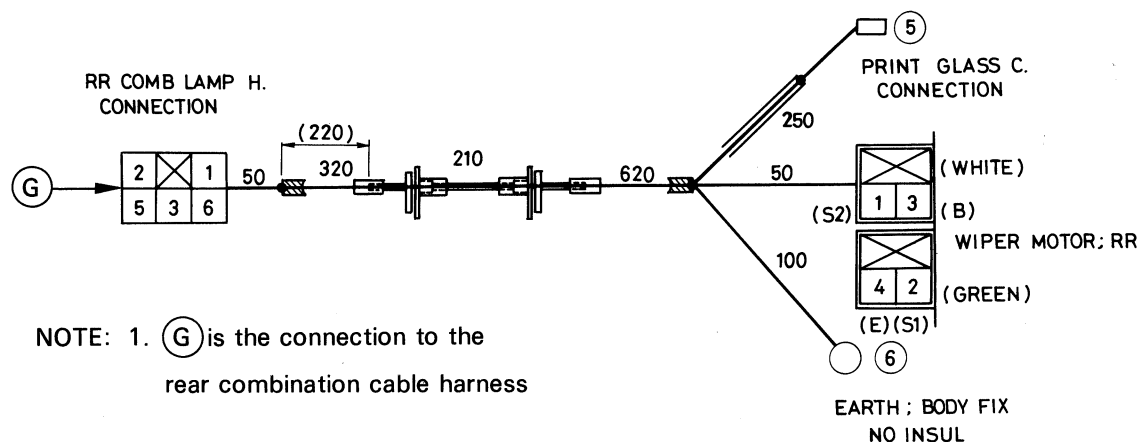
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	0.85	RL	Body harness connection	Combination harness connection	Back up lamp
2	0.85	GR	Body harness connection	Combination harness connection	Tail lamp
3	0.85	G	Body harness connection	Combination harness connection	Stop lamp
4	0.85	GL	Body harness connection	Combination harness connection	Turn/signal ; RH
5	0.85	GB	Body harness connection	Combination harness connection	Turn/signal ; LH
6	0.85	YR	Body harness connection	Fuel tank unit	Fuel meter
7					
8	1.25	B	Earth ; Frame fixing	Combination harness connection	Earth
9	0.5	B	Joint to No. 8	Fuel tank unit	
10	0.85	LW	Body harness connection	Combination harness connection	RR wiper (S2)
11	0.85	LR	Body harness connection	Combination harness connection	RR wiper (S1)
12	0.85	L	Body harness connection	Combination harness connection	RR wiper (B)
13	0.85	LB	Body harness connection	Combination harness connection	RR wash (switch)
14	1.25	LR	Body harness connection	Combination harness connection	RR defog (B)
15	0.5	RY	Body harness connection	Combination harness connection	RR door switch
16	0.5	YL	Body harness connection	Fuel tank unit	Warning light ; fuel empty

REAR COMBINATION CABLE HARNESS



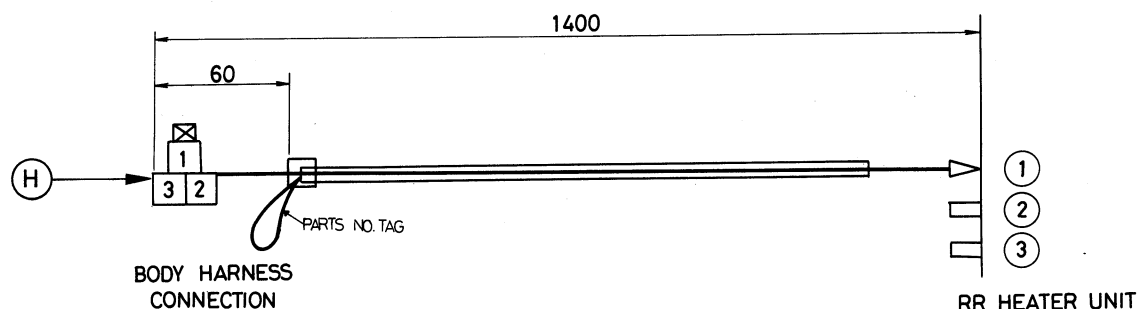
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	0.85	RL	Chassis harness connection	Combination L, RR RH	Backup lamp
2	0.85	GR	Chassis harness connection	Combination L, RR RH	Tail lamp
3	0.85	GR	Chassis harness connection	Combination L, RR RH	Tail lamp
4	0.5	GL	Chassis harness connection	Combination L, RR RH	Turn signal lamp ; RH
5					
6	0.85	B	Joint to No. 12	Combination L ; RR, RH	Earth
7	0.85	RL	Joint to No. 1	Combination L ; RR, LH	B/up lamp
8	0.85	GR	Joint to No. 2	Combination L ; RR, LH	Tail lamp
9	0.85	G	Joint to No. 3	Combination L ; RR, LH	Stop lamp
10	0.5	GB	Chassis harness connection	Combination L ; RR, LH	Turn signal lamp ; LH
11					
12	1.25	B	Chassis harness connection	Combination L ; RR, LH	Earth
13	0.5	GR	Joint to No. 2	License plate L	
14					
15	0.5	B	Joint to No. 6	License plate L	Earth
16					
17	0.85	LW	Chassis harness connection	RR wiper & defroster harness connection	RR wiper (S2)
18	0.85	LR	Chassis harness connection	RR wiper & defroster harness connection	RR wiper (S2)
19	0.85	L	Chassis harness connection	RR wiper & defroster harness connection	RR wiper (B)
20	1.25	B	RR wiper & defroster harness connection	Joint to No. 12	Earth
21	0.85	L	Joint to No. 19	Washer motor ; RR	RR wash (B)
22	0.85	LB	Chassis harness connection	Washer motor ; RR	RR washer (switch)
23	1.25	LR	Chassis harness connection	RR wiper & defroster harness connection	Defogger (B)
24	0.5	RY	Chassis harness connection	Switch ; RR door	

REAR WIPER & DEFOGGER CABLE HARNESS (If so equipped)



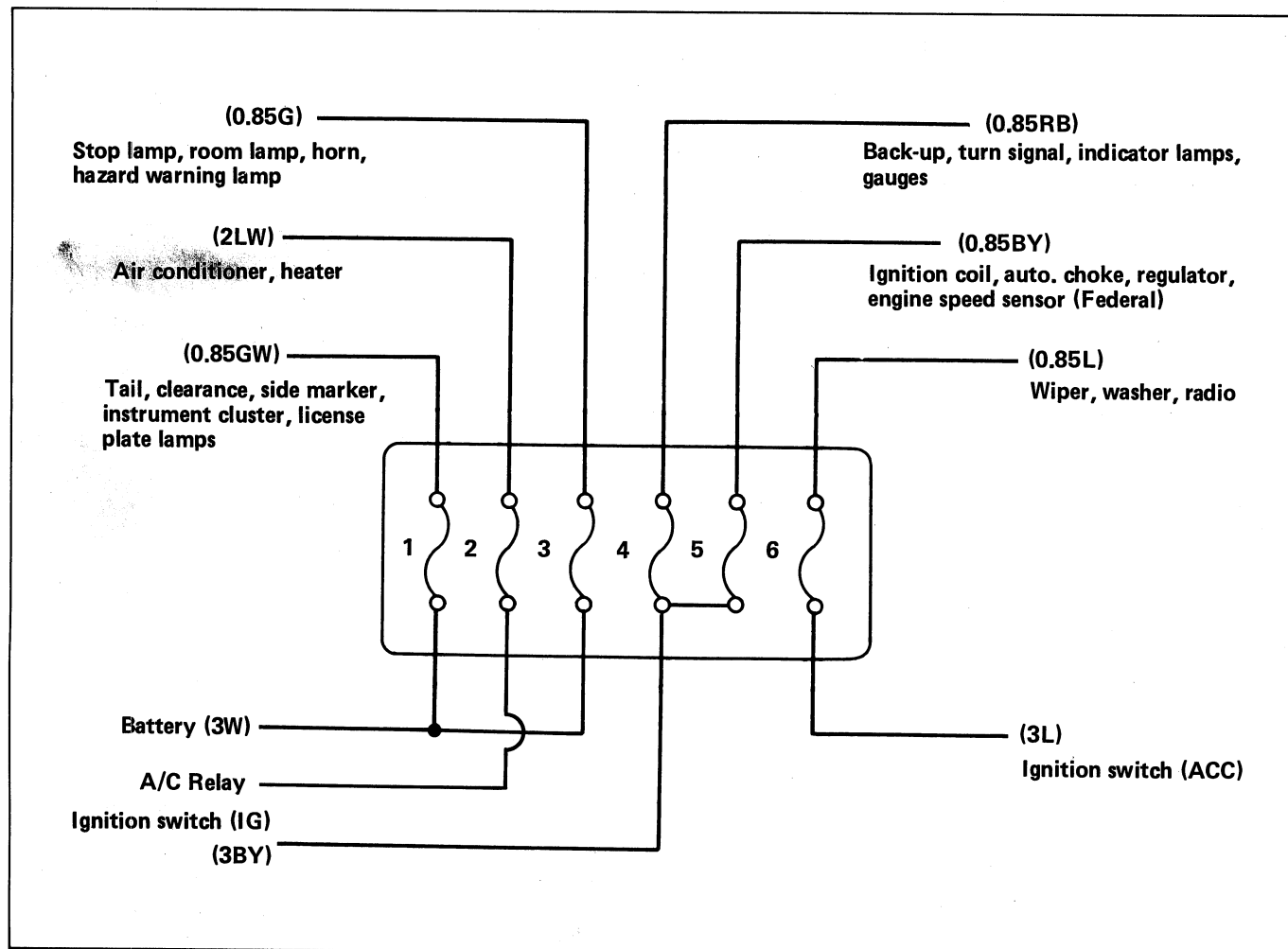
Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	0.85	LW	Combination lamp harness connection	Wiper moter ; RR	RR wiper (S2)
2	0.85	LR	Combination lamp harness connection	Wiper moter ; RR	RR wiper (S1)
3	0.85	L	Combination lamp harness connection	Wiper moter ; RR	RR wiper (B)
4	0.85	B	Joint to No. 6	Wiper motor ; RR	Earth
5	1.25	LR	Combination lamp harness connection	Print glass c. connection	RR defogger (B)
6	1.25	B	Combination lamp harness connection	Earth ; body fix	Earth

REAR HEATER CABLE HARNESS (If sp equipped)



Terminal No.	Cable spec.		Terminal connection position		Remark
	Size	Color	Main connection	Branch connection	
1	0.85	B	Body harness connection	Rear heater unit	Earth
2	0.85	LW	Body harness connection	Rear heater unit	Low
3	0.85	LR	Body harness connection	Rear heater unit	High

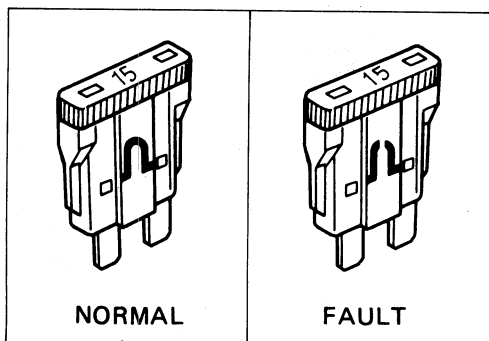
FUSE



INSPECTION AND REPAIR

Anytime a fuse blows, always check the circuit and its related parts for possible overloading. Any cause of circuit overload must be corrected.

If no trouble is evident, replace the fuse.



Fuse replacement

Pull out the fuse holder to replace the fuse.

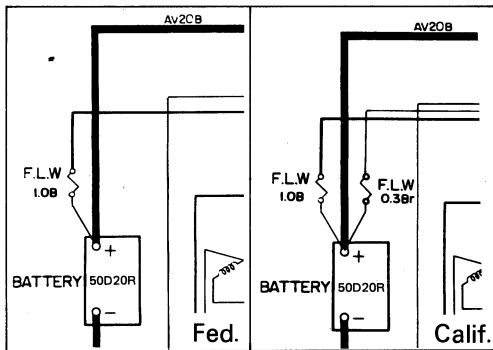
The replacement fuse should be of the same amperage as the original. Never replace a blown fuse with a fuse of a higher amperage. Doing so can result in serious damage to the circuit.

FUSIBLE LINK WIRES

In the event of a circuit overload, fusible link wires are designed to melt and open the circuit, thus protecting the entire wiring harness from damage.

Before replacing fusible link wires, be sure to determine and correct the cause of the overload.

Always check fusible link wires with a tester. Breaks in fusible link wires can not be detected visually.



Location of fusible link wires

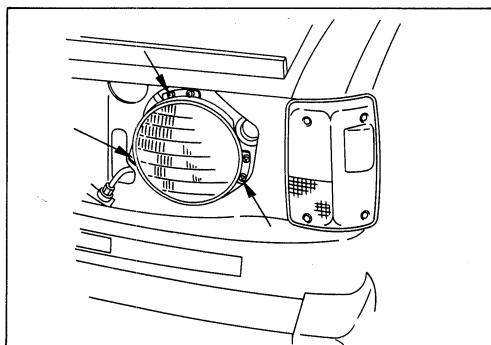
Fusible link wires specification

Cable code	Color coding	Sectional area (mm ²)	Max. allowable current (Amp)
0.3 Br	Brown	0.3016	13
1.0 B	Black	1.0860	26

LIGHTS

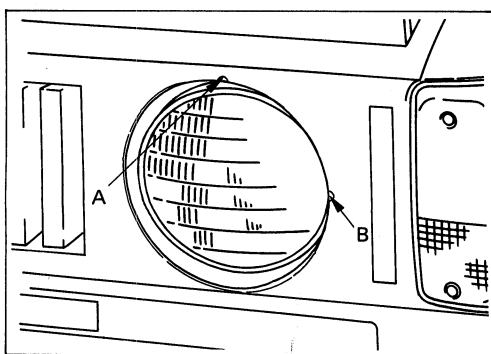


INSPECTION AND REPAIR

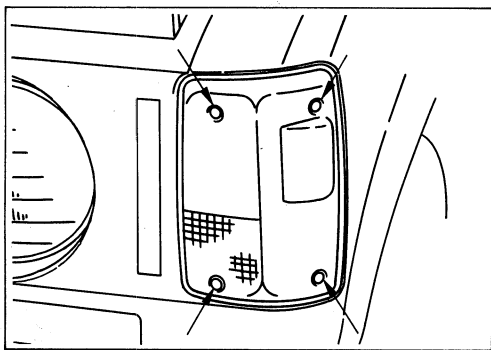


Head light

1. Remove the radiator grille as outlined in Section 3.
2. Remove 3 screws attaching the sealed beam.
3. To install, fit the bosses on the headlamp lens into the grooves so that the "TOP" mark is up. Tighten the 3 attaching screws and install the radiator grille.

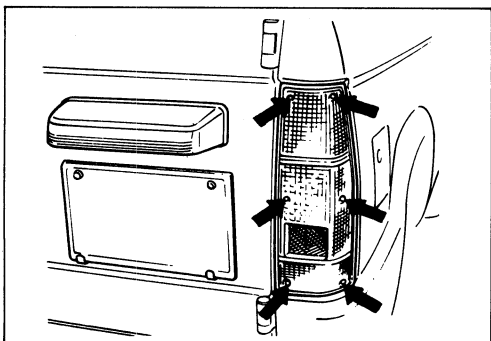


1. Prior to aiming the headlamps, check and adjust the tire inflation pressures, clean the headlight lens, park the vehicle on level ground and remove all weight from the body.
2. Use screw A for vertical adjustment and screw B for horizontal adjustment.



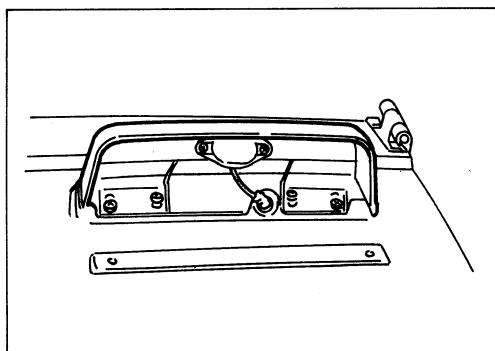
Front combination lights

To replace the bulb, take out the four (4) screw fixing the lens.



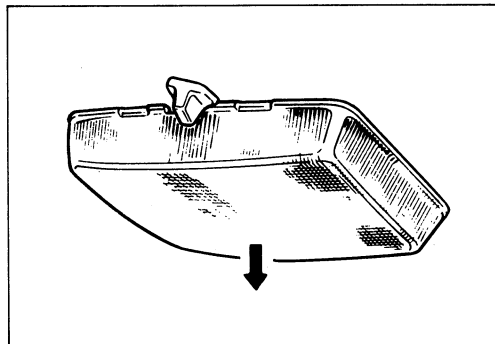
Rear combination lights

To replace the bulbs, take out the six (6) screws fixing the lens.



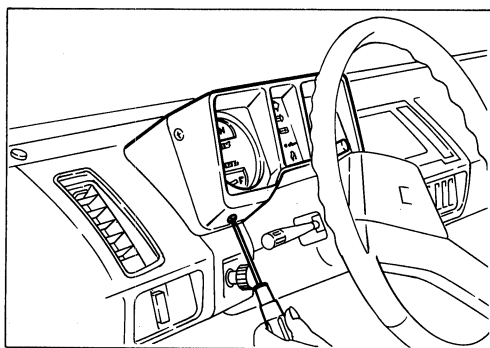
License plate lights

To replace the bulb, take out the four (4) screws retaining the light lens.



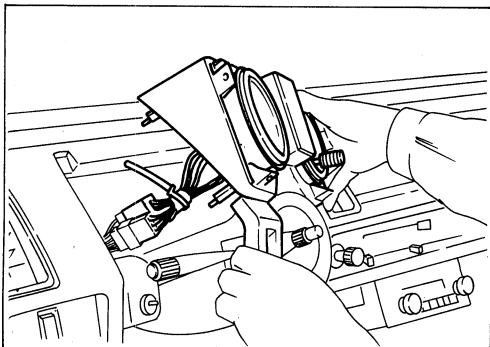
Dome light (rear dome light ; if so equipped)

METERS

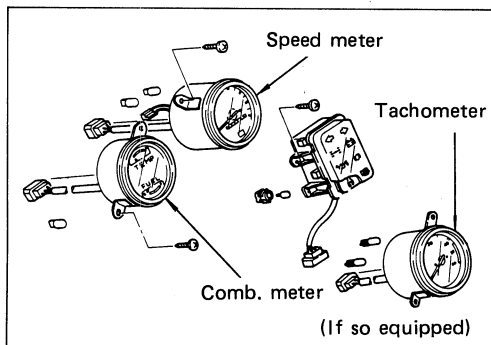


Removal

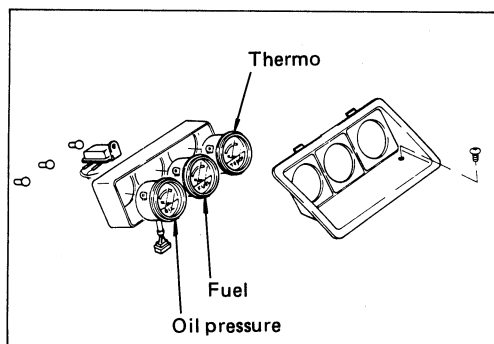
1. Wheel, steering
2. Knob ; lighting switch
3. Hood ; meter



4. Panel with meter assembly
5. Meter cable and harness connectors



6. Meter assembly



7. Sub-meter assembly (If so equipped)



Installation

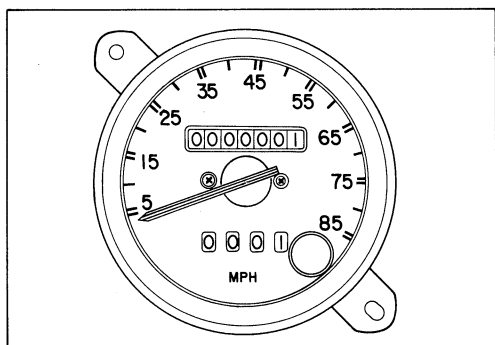
To install, follow the removal procedure in reverse order.



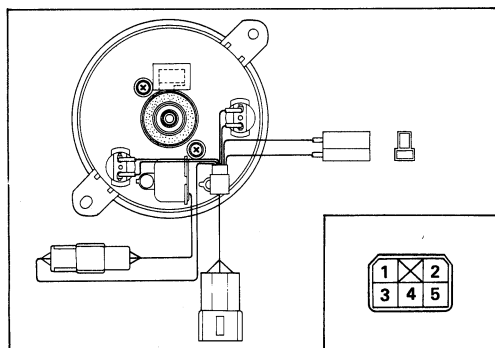
INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

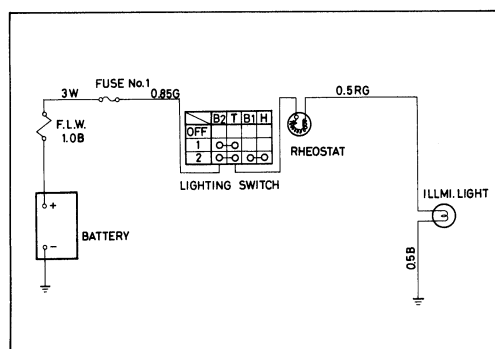
SPEEDOMETER



Speedometer assembly

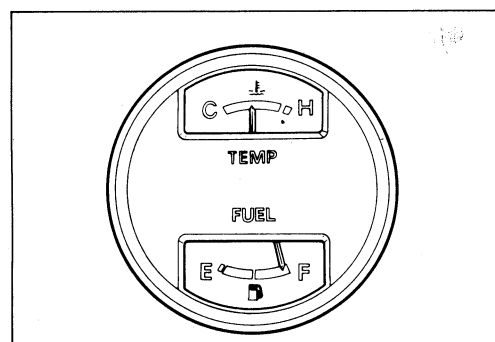


No.	Connection place	Color	Size
1	Illumination light	RG	0.5
2	Earth	B	0.5
3	Seat belt	YR	0.5
4	Seat belt light	L	0.5
5	Timer (seatbelt)	Y	0.5



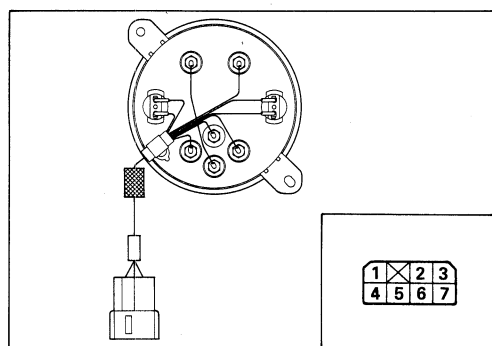
Circuits

COMBINATION METER (FUEL GAUGE AND TEMPERATURE GAUGE METER)



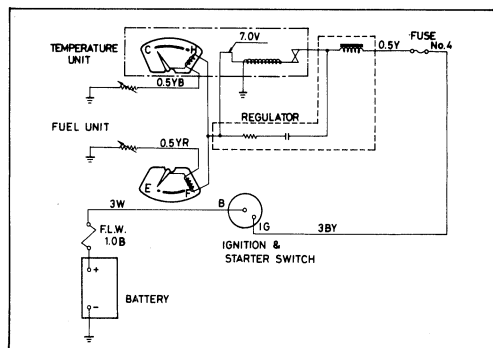
Meter assembly

04—80 ELECTRICALS



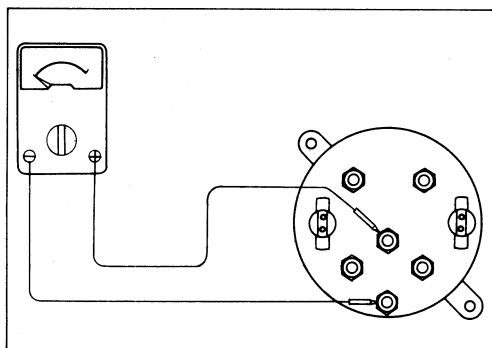
No.	Connection place	Color	Size
1	Switch lighting	RG	0.5
2	Temp	YB	0.5
3	Earth	B	0.5
4	Fuel	YR	0.5
5	NC		
6	NC		
7	Elec. source	Y	0.5

Circuits



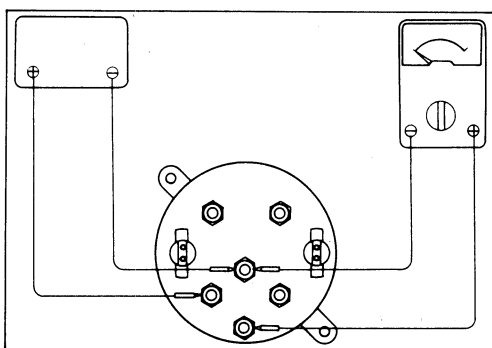
Voltage regulator resistance

Resistance 110 Ω



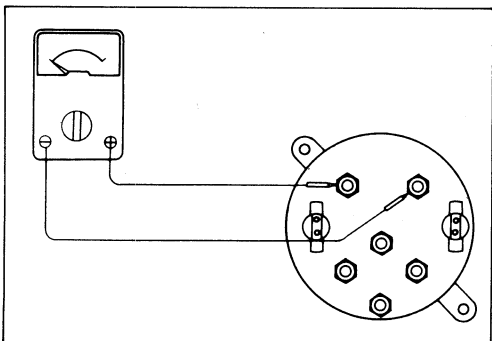
Voltage regulator operational test

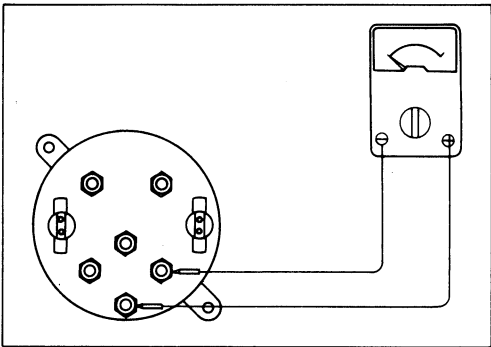
Normal voltage 7.0V



Temperature gauge resistance

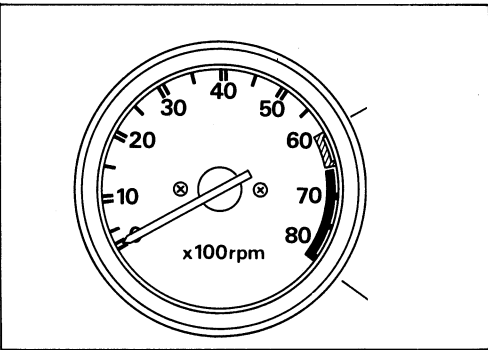
Resistance 25 Ω



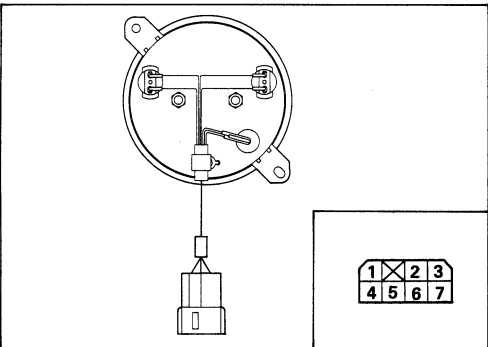


Fuel gauge resistance
Resistance 25 Ω

TACHOMETER (IF SO EQUIPPED)

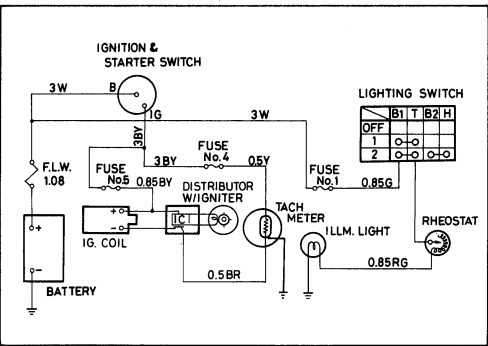


Tachometer assembly

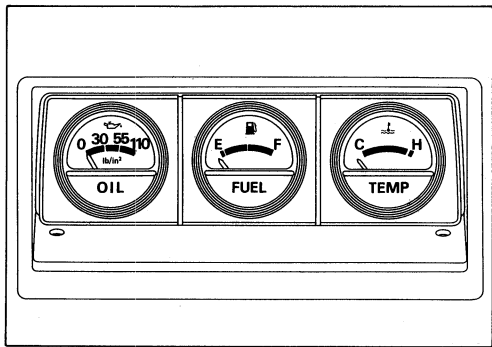


No.	Connection place	Color	Size
1	Light	RG	0.5
2	NC		
3	Earth	B	0.5
4	NC		
5	Tachometer	LB	0.5
6	NC		
7	Elec. source	Y	0.5

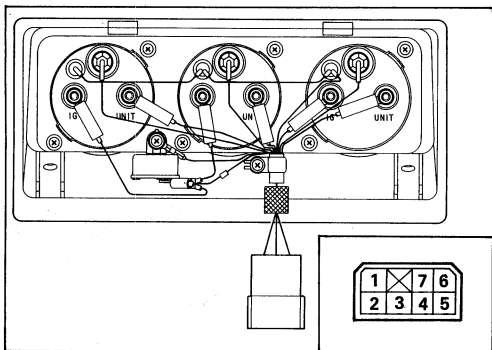
Circuits



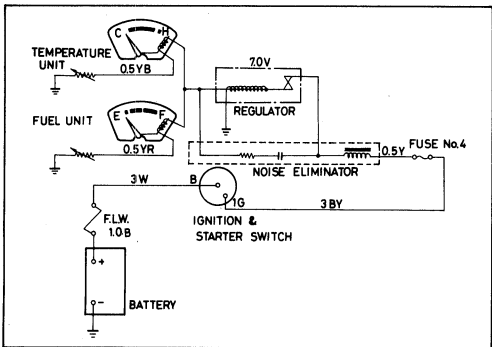
SUB : METER ASSEMBLY (IF SO EQUIPPED)



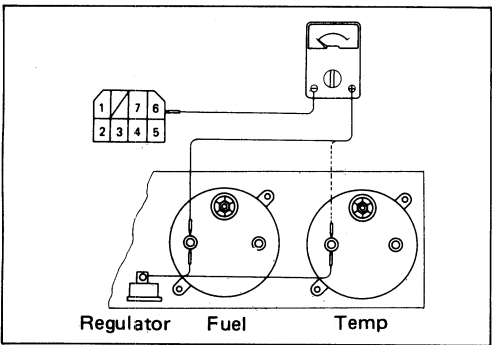
Meter assembly



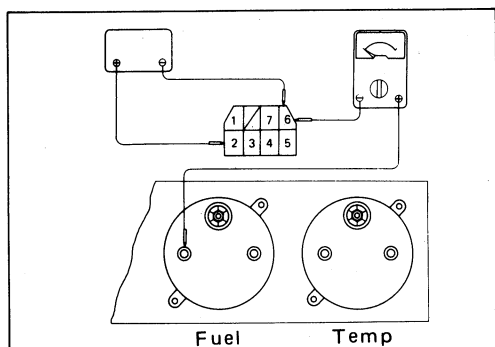
No.	Connection place	Color	Size
1	Fuel	YR	0.5
2	Elec. Source	Y	0.5
3	Oil gauge	YW	0.5
4	Temp gauge	YB	0.5
5	Light	RG	0.5
6	Earth	B	0.5
7	NC		



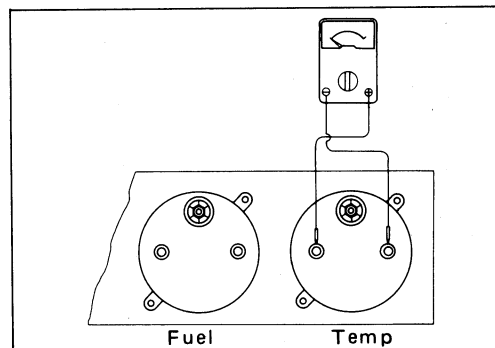
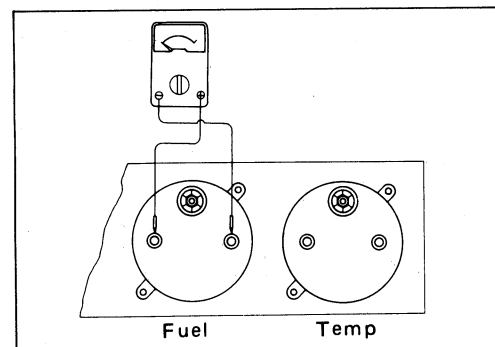
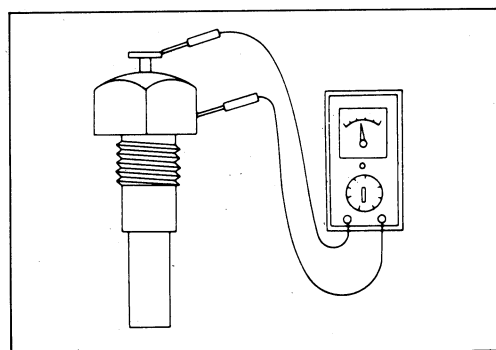
Circuits



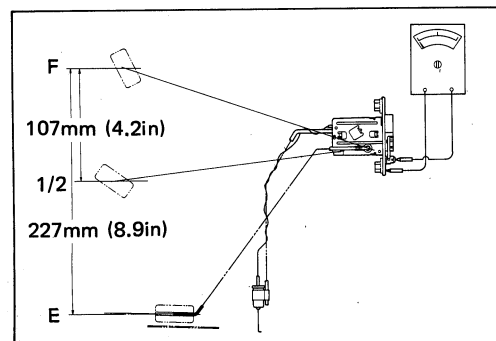
Voltage regulator resistance
Resistance 110 Ω

**Voltage regulator operation test**

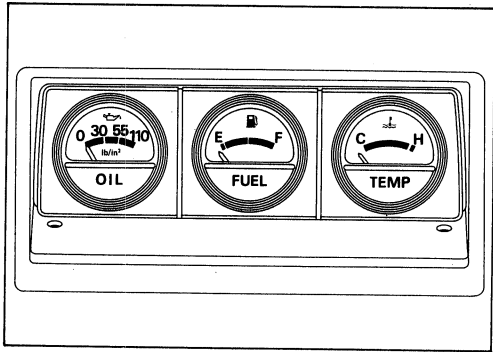
Normal voltage 7.0V

**Temperature gauge resistance**Resistance 25 Ω **Fuel gauge resistance**Resistance 25 Ω **Temperature gauge unit**

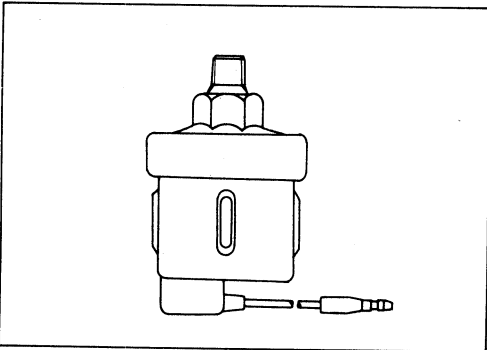
Temperature indication	(°C)	60	115
Standard resistance	(Ω)	146.6	24.3

**Fuel gauge tank unit**

Float level	E	1/2	F
Standard resistance (Ω)	120	45	17



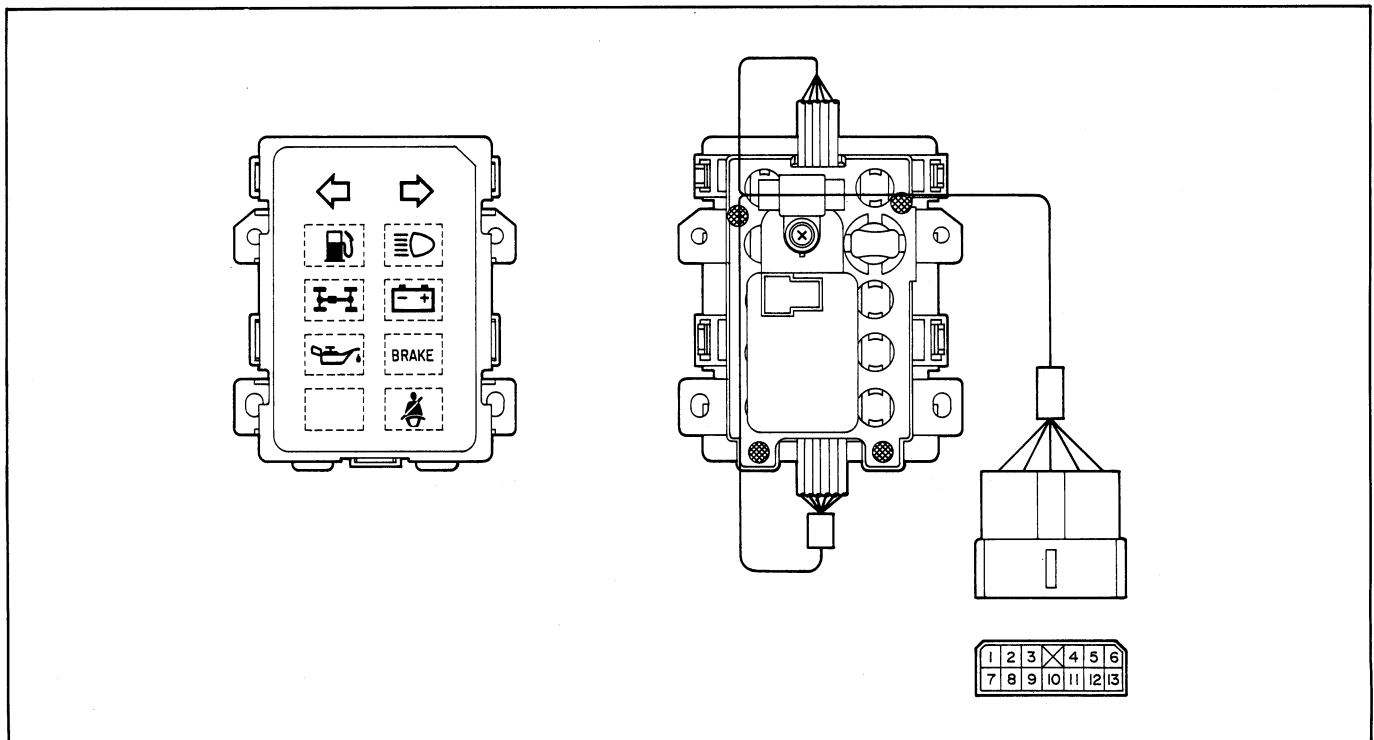
Oil pressure gauge assembly



Gauge unit

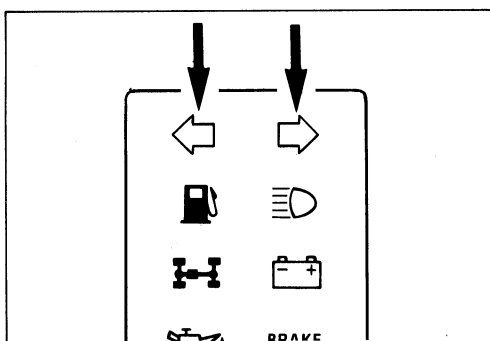
Indication pressure	lb/in ² (kg/cm ²)	0	7 (0.5)	85 (6.0)
Output resistance	(Ω)	19.0	22.6	110

WARNING LIGHTS



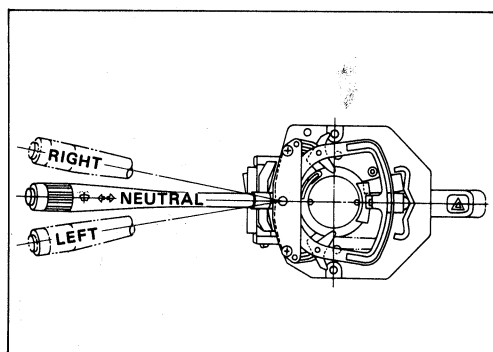
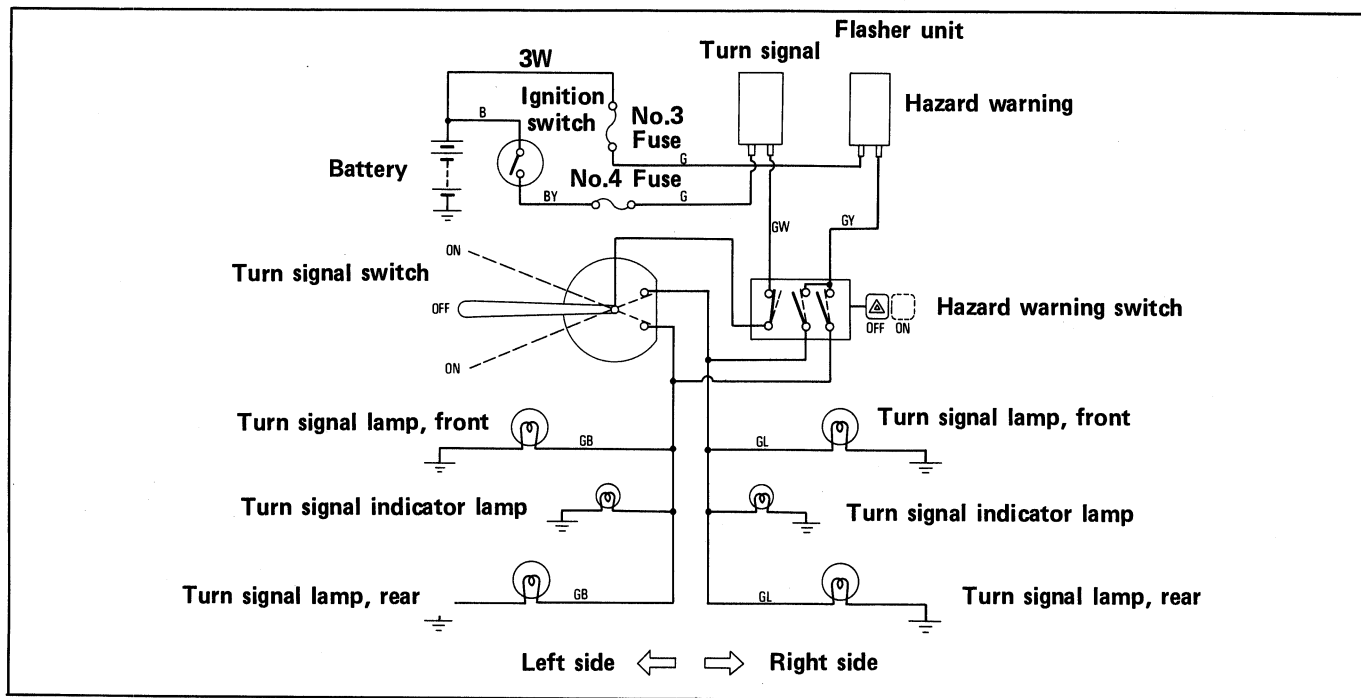
No.	Connection place	Color	Size
1	Turn signal indicator light LH	GL	0.5
2	Turn signal indicator light RH	GB	0.5
3	Earth	B	0.5
4	Fuse No. 4	Y	0.5
5	4WD indicator light	LW	0.5
6	Discharge warning light	WR	0.5
7	Brake system warning light	YG	0.5

No.	Connection place	Color	Size
8	Engine oil pressure warning light	YL	0.5
9	Check engine warning light (California only)	Lg	0.5
10	Low fuel warning light	BR	0.5
11	Check engine fuse No. 5 (California only)	Lg	0.5
12	Headlight high beam indicator light	R	0.5
13	Seat belt system reminder light	YR	0.5



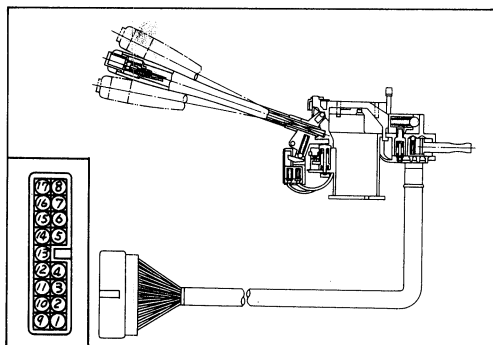
Turn signal indicator (Hazard warning lights)

Circuits

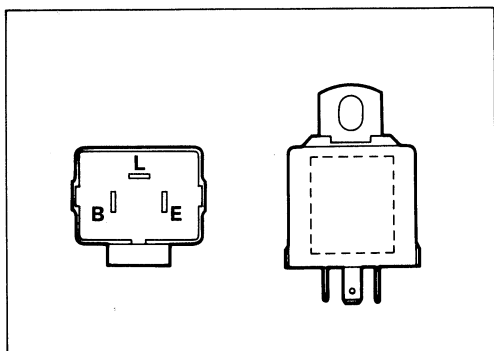


Turn signal and hazard warning switch

Cable color and No.	GW/③	GL/②	GB/①	GY/④
Switch position				
RH	○	○		
LH	○		○	
Hazard ON		○	○	○



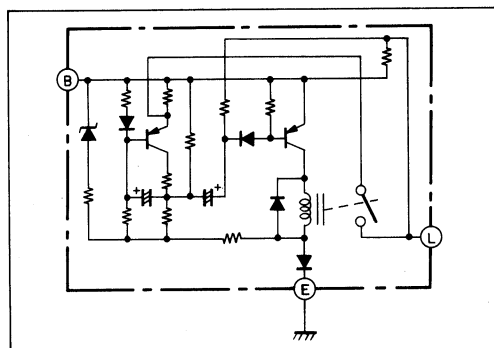
No.	Connection place	Color	Size
1	Turn Signal Lamp, L.H	GB	0.5
2	Turn Signal Lamp, R.H	GL	0.5
3	Turn Signal Flasher Unit	GW	0.5
4	Hazard Warning Flasher Unit	GY	0.85
5	Wiper Motor, Low	LW	0.85
6	Wiper Motor, High	LY	0.85
7	Washer Motor	LB	0.5
8	Self Parking	LR	0.85
9	Earth	B	0.85
10	Light Control Switch	RW	1.25
11	—		
12	Head Light, Low Beam	RY	1.25
13	—		
14	Head Light, High Beam	R	1.25
15	—		
16	Circuit Breaker	G	1.25
17	Horn	GR	0.85



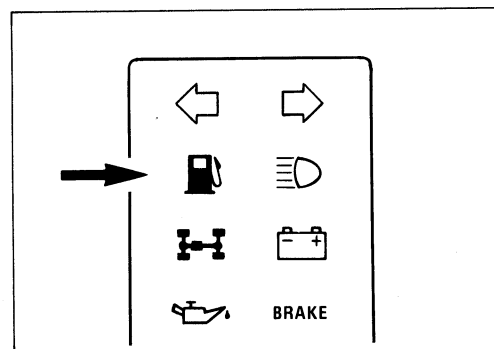
Flasher unit (Hazard)

TERMINAL	CONNECTION PLACE
B	Flasher Fuse No. 4
	Hazard Fuse No. 3
E	Earth
L	Combination Switch

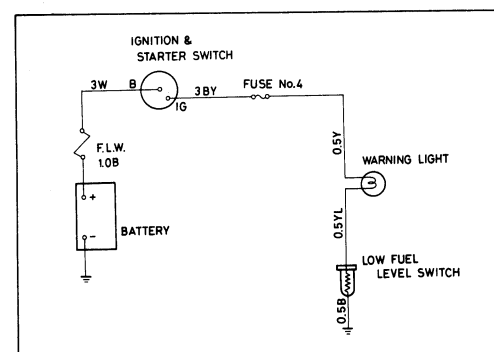
Circuits



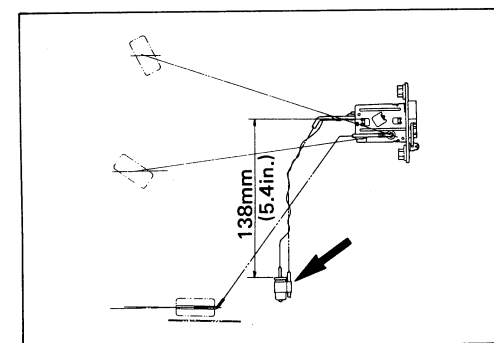
Low fuel level warning light

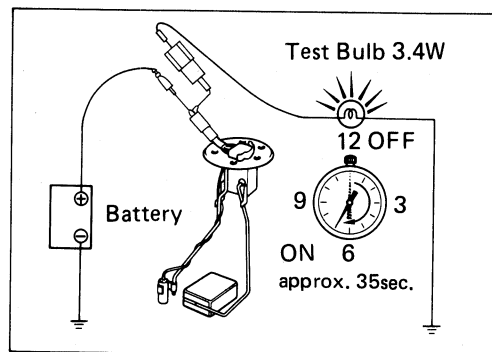


Circuits



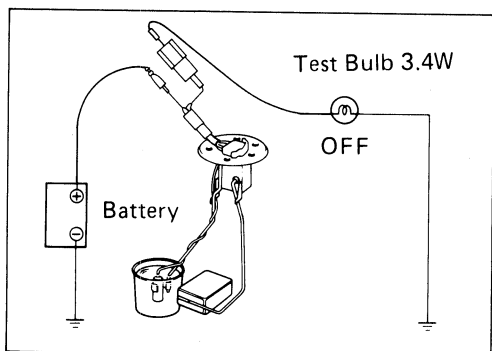
Low fuel level gauge



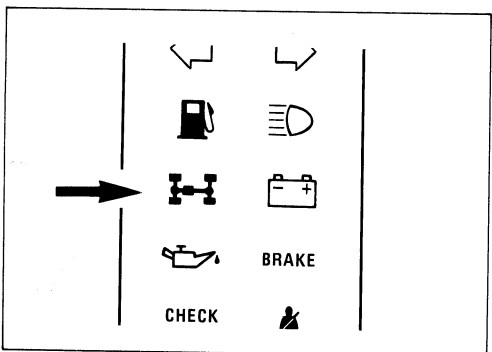


Inspect fuel level warning switch

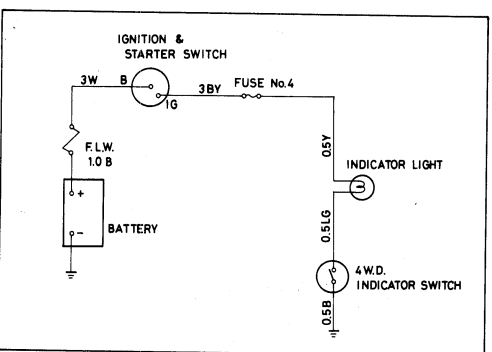
1. Connect a 12V battery to the sending unit and ground through a 3.4 W bulb. The bulb should light up.



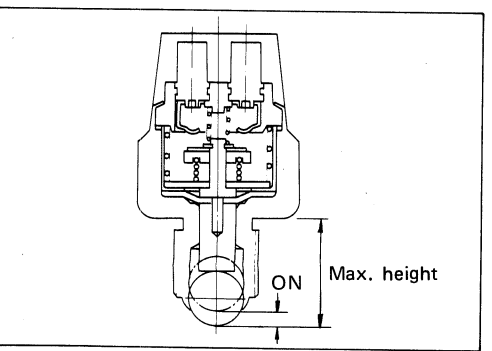
2. When the switch is immersed in water under the above condition, the bulb should go out. If the bulb remains lit, replace the fuel sending unit.



4WD indicator light

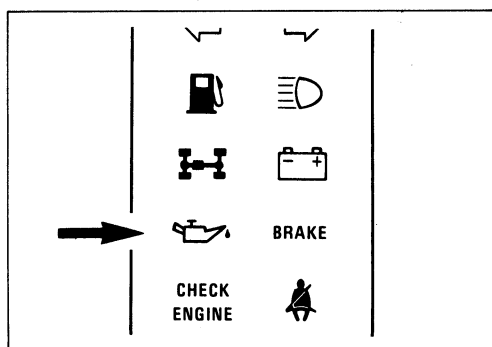


Circuits

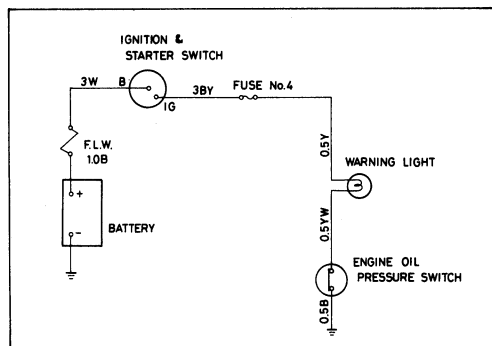


4WD indicator switch

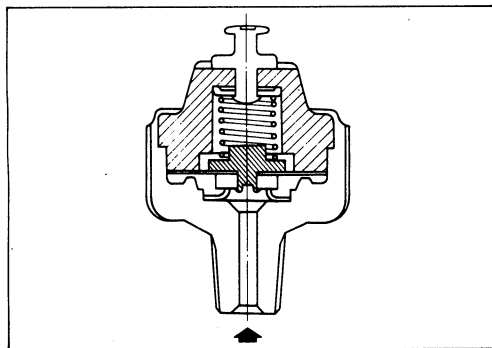
This switch is on when depressed at 1.13 mm (0.04 in.) from the top.



Engine oil pressure warning light

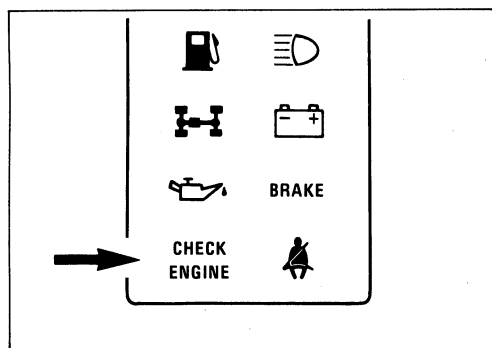


Circuits



Oil pressure switch

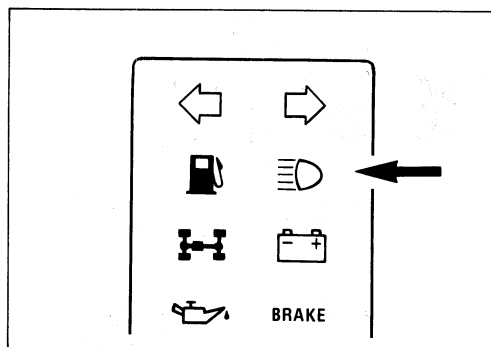
Opening and closing of the contact points in the switch is controlled by oil pressure. The switch closes when oil pressure drops to between 0.3 and 0.5 kg/cm² (4 and 7 psi).



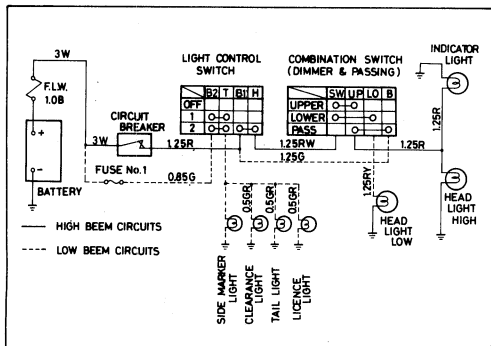
Check engine indicator light (For california only)

Circuit

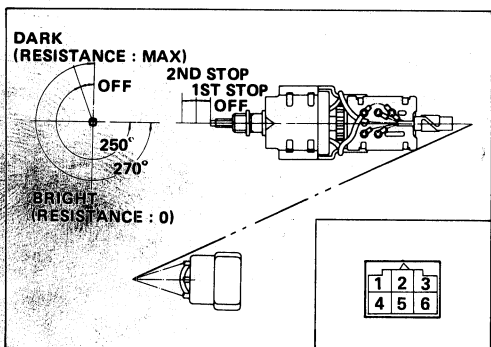
Refer to section 03 "EMISSION CONTROL AND EXHAUST SYSTEM".



Headlight high beam indicator light



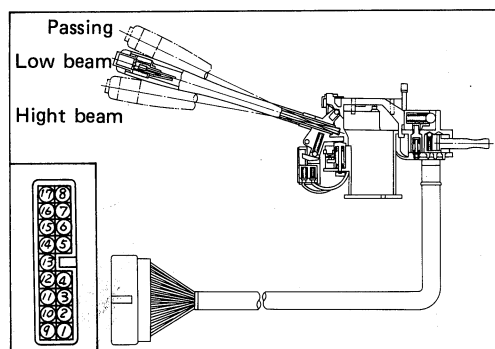
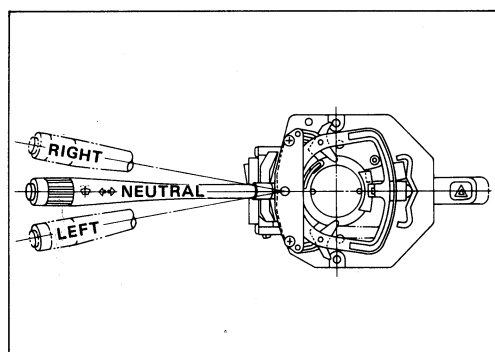
Circuits



Lighting control switch

No.	Connection place	Color	Size
1	NC		
2 (B2)	Circuit breaker	R	1.25
3 (B1)	Elec. source	G	2.0
4 (M)	Instrument cluster lights	RG	0.5
5 (H)	Dimmer switch	RW	1.25
6 (T)	Clearance tail side marker lights	GR	2.0

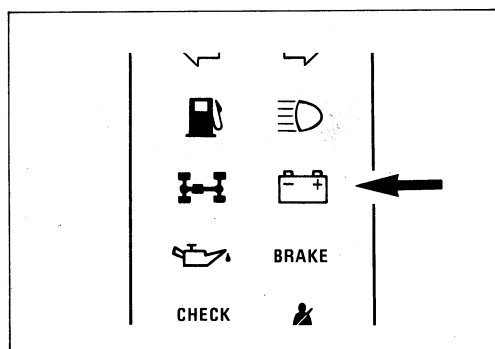
Cable color and No.	G/3 (B1)	R/2 (B2)	RW/5 (H)	GR/6 (T.F)	RG/4 (M)
Switch position					
OFF				○	○
Pull 1 step		○		○	○
Pull 2 step	○	○		○	○



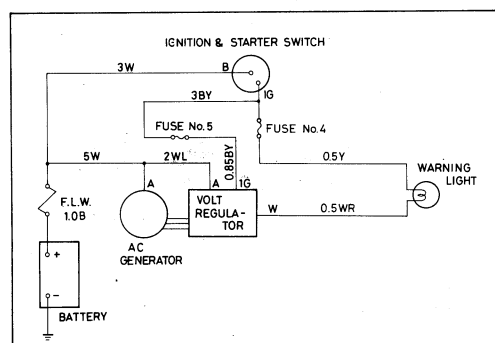
Combination switch (Dimmer and passing)

No.	Connection place	Color	Size
1	Turn Signal Lamp, L.H	GB	0.5
2	Turn Signal Lamp, R.H	GL	0.5
3	Turn Signal Flasher Unit	GW	0.5
4	Hazard Warning Flasher Unit	GY	0.85
5	Wiper Motor, Low	LW	0.85
6	Wiper Motor, High	LY	0.85
7	Washer Motor	LB	0.5
8	Self Parking	LR	0.85
9	Earth	B	0.85
10	Light Control Switch	RW	1.25
11	—	—	—
12	Head Light, Low Beam	RY	1.25
13	—	—	—
14	Head Light, High Beam	R	1.25
15	—	—	—
16	Circuit Breaker	G	1.25
17	Horn	GR	0.85

Cable color and No.	R/(14)	RW/(10)	RY/(12)	G/(16)
Switch position				
Low Beam		○ — ○		
High Beam	○ — ○			
Passing	○ — ○			○ — ○

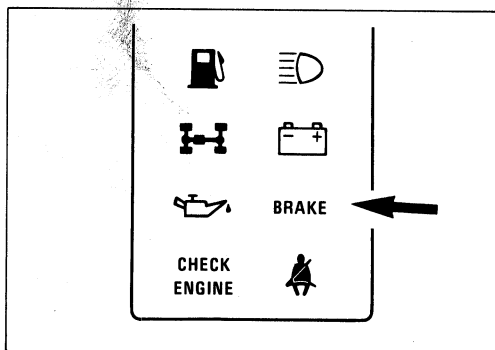


Discharge warning light

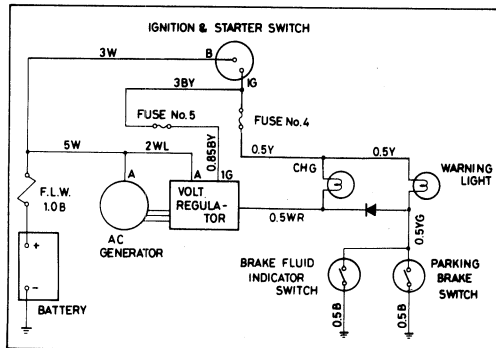


Circuits

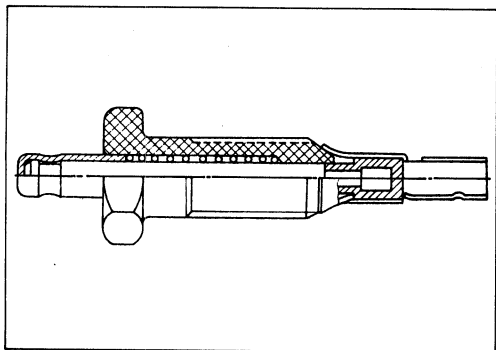
Voltage regulator circuits refer to this section "ENGINE ELECTRICAL".



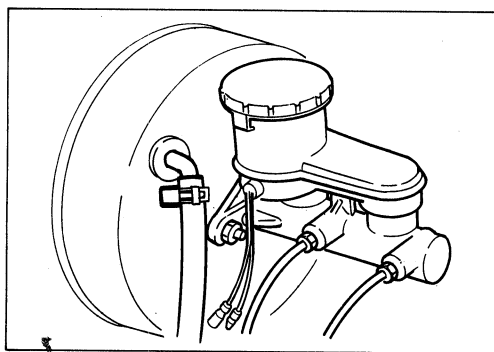
Brake system warning light



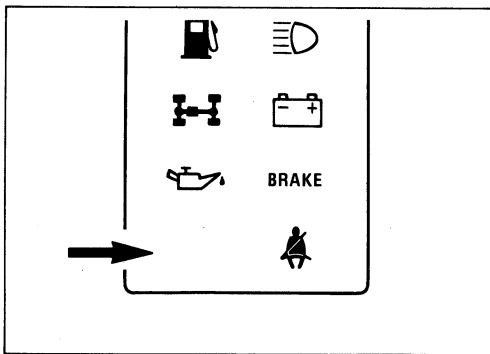
Circuits



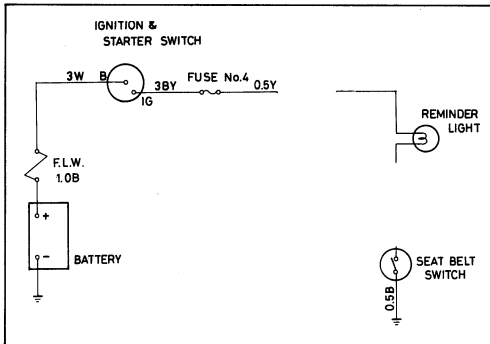
Parking brake switch



Brake fluid indicator switch



Seat belt system reminder light

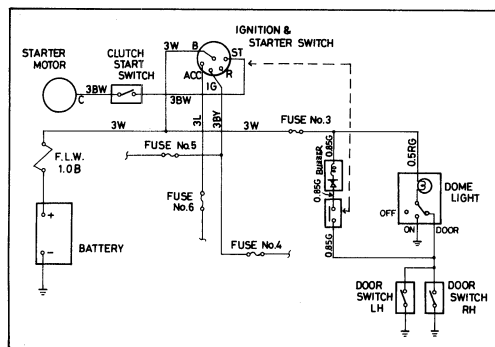
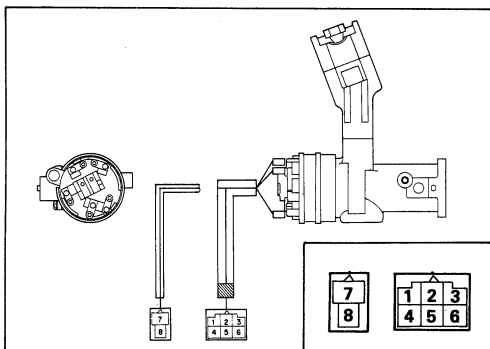
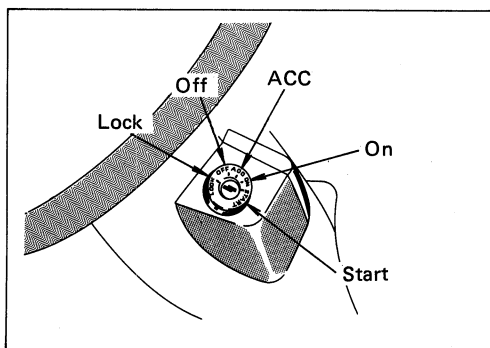


Circuits

Timer operating time at normal temperature is 4 to 8 seconds.

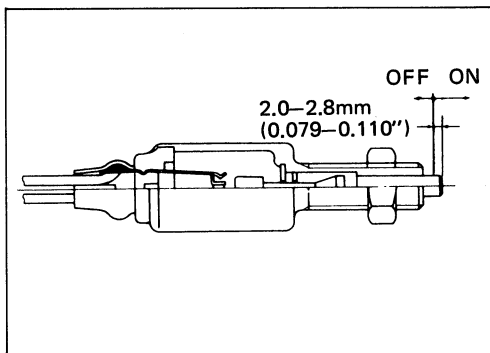
SWITCHES

Ignition & starter switch



Circuits

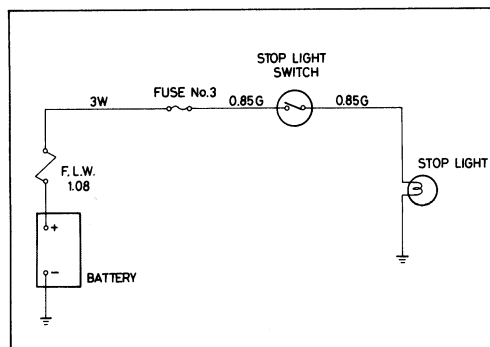
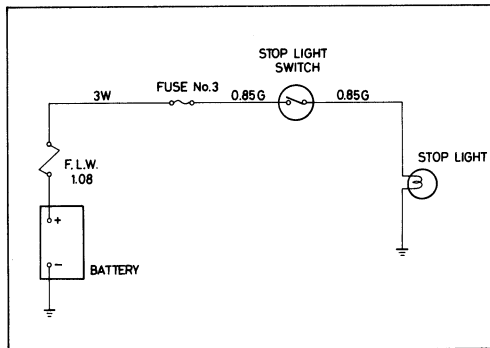
		Circuits					Steering Lock		Key Reminder	
Key position	Key	Battery B	Accessories ACC	Ignition IG	Starter		Clock wise	Counter clock wise	W	W
LOCK	Removed						Lock	Lock		
	Inserted						Lock	Free		
OFF							Free	Free		
ACC										
ON										
START										



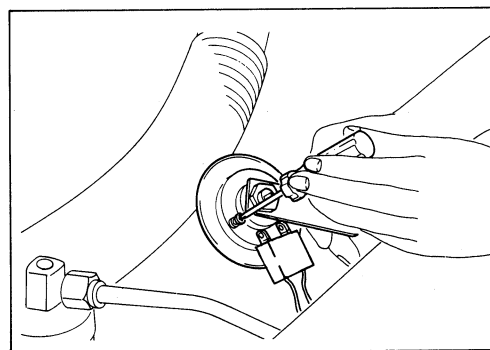
STOP light switch

The switch is normal if continuity exists between the terminals when the switch plunger is all the way out.

Circuits

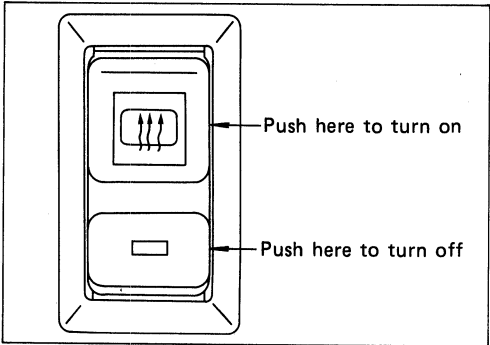


Horn switch circuits

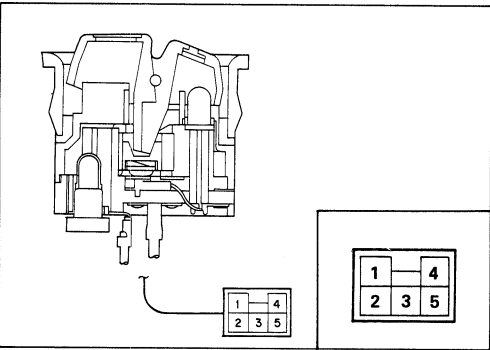


If the horn does not sound when the horn button is depressed, or if sound of the horn is abnormal, check the wiring and battery voltage, and then make the following tests:

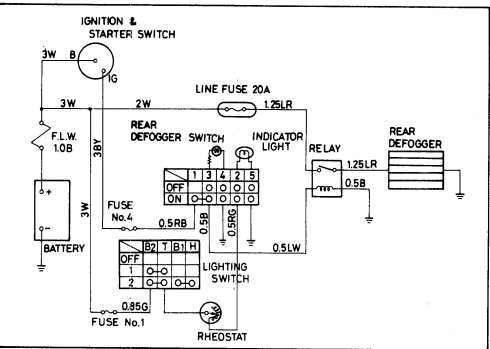
1. Check for a burned out fuse. Also check the wiring for poor connections.
2. If the fuse and wiring are found to be normal, connect the grounding terminal (cable color; GR side) of the horn body to the body ground.
 - a. **Horn Sounds** — The circuits between the horn and the horn switch is open or the horn switch is defective.
 - b. **Horn Does Not Sound** — The horn is defective and must be replaced.
3. If the fuse and connector are in normal working order, remove the horn shroud from the steering wheel and short between the lead wire terminal of the horn switch and the threaded portion of the steering shaft.
 - a. **Horn Does Not Sound** — Horn contact in the combination switch is in poor contact with the lower part of steering wheel.
 - b. **Horn Sounds** — The horn switch is defective.
4. If the horn continues to sound and does not stop, the trouble is due to a defective horn switch or to a poor return contact ring.



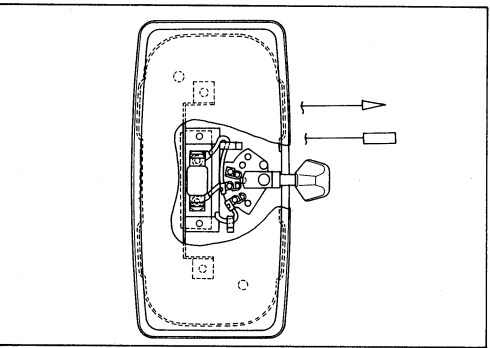
Rear defogger switch (If so equipped)



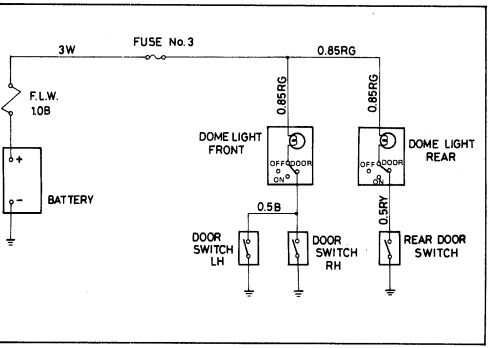
No.	Connection place	Color	Size
1	Fuse No. 4	BY	0.5
2	Indicator light	RG	0.5
3	Relay	LW	0.5
4	Earth	B	0.5
5	Earth	B	0.5



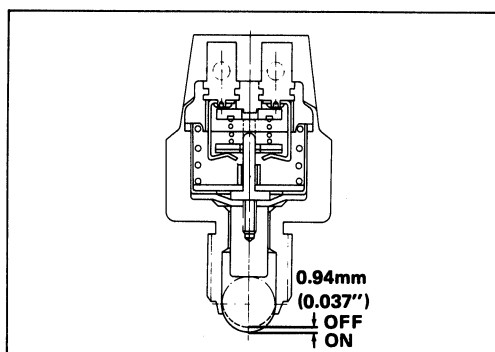
Circuits



Dome light (Rear dome light - If so equipped)

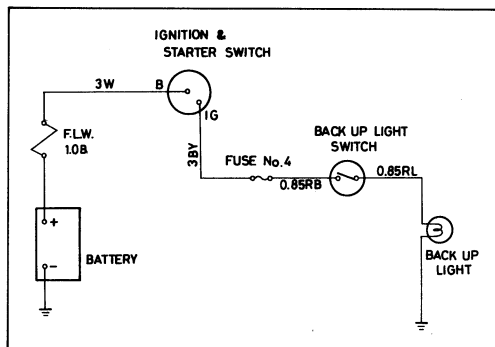


Circuits

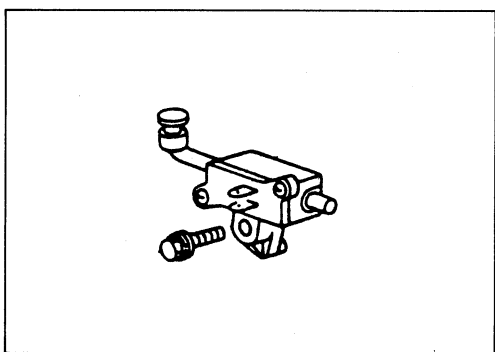


Back up light switch

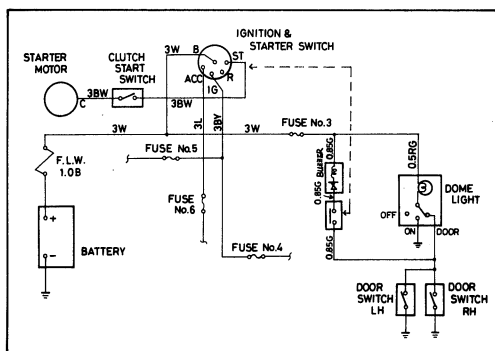
This switch is off when depressed at 0.93 mm (0.037") from the top.



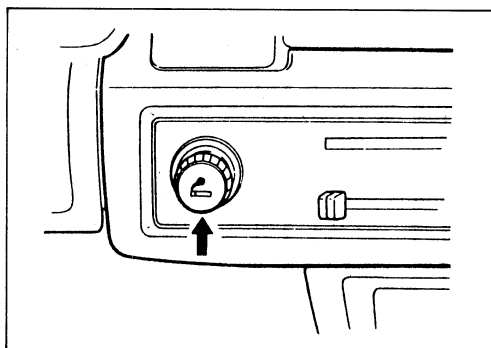
Circuits



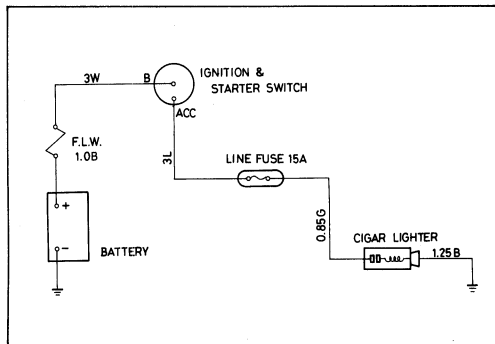
Clutch start switch



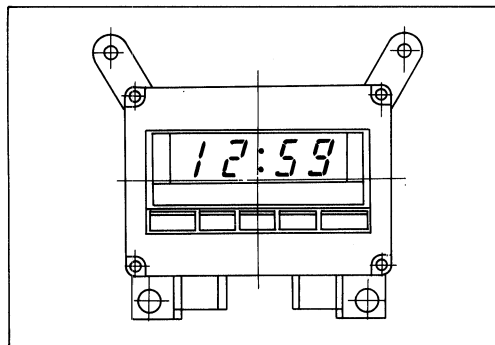
Circuits



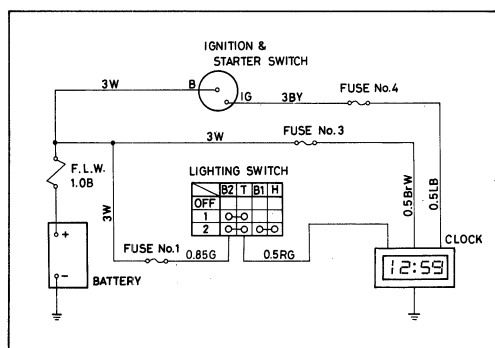
Cigar lighter



Circuits



Clock (If so equipped)

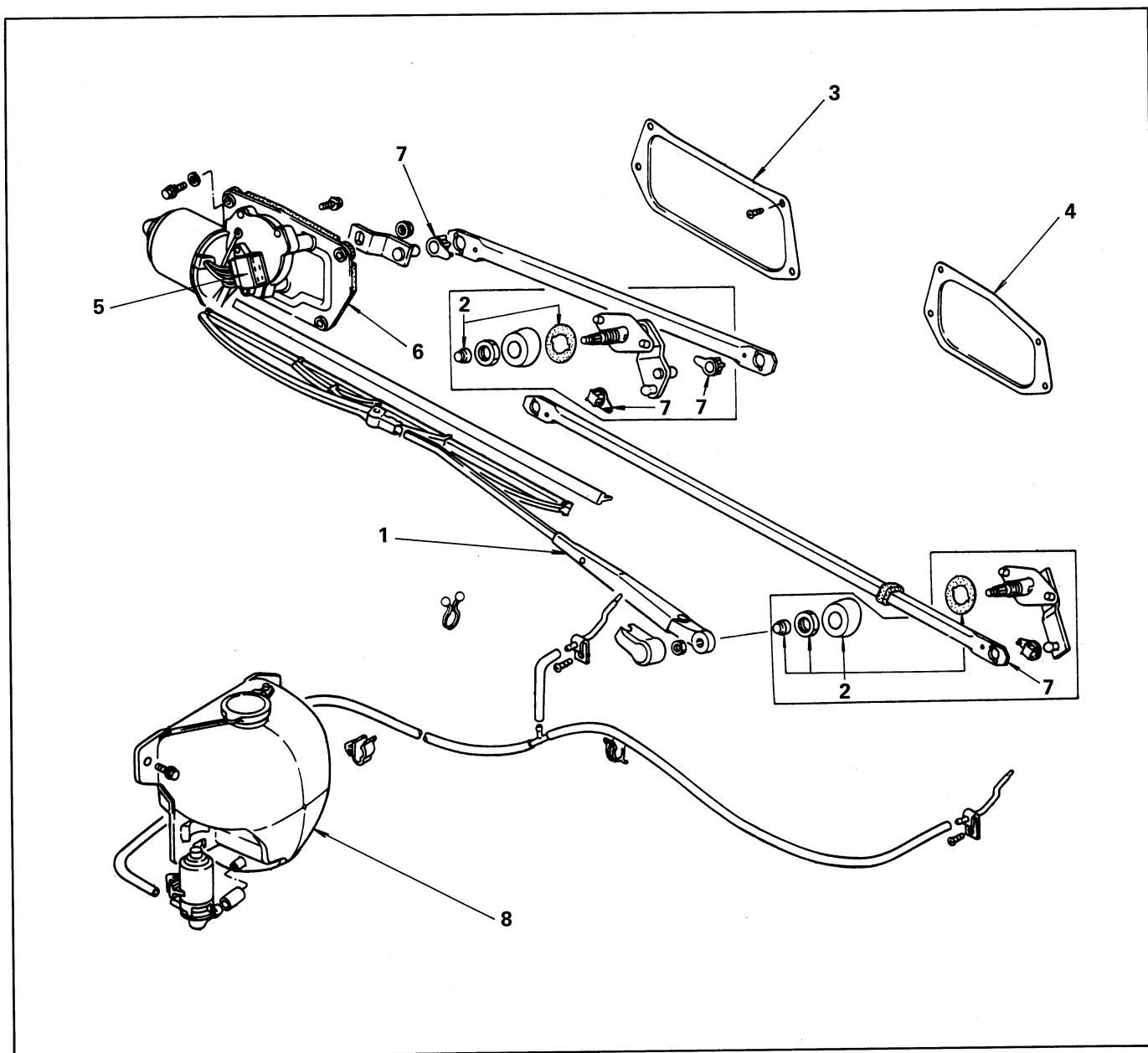


Circuits

WINDSHIELD WIPER MOTOR AND LINKAGE



REMOVAL AND INSTALLATION



Removal steps

- ▲ 1. Wiper arm assembly
- 2. Nut ; link pivot
- 3. Cover ; work hole centor
- ▲ 4. Cover ; work hole left
- 5. Connector ; wiring
- ▲ 6. Wiper motor assembly with link assembly
- ▲ 7. Link joint ; retainer
- 8. Tank assembly

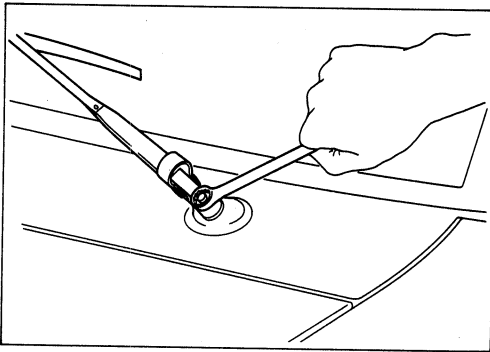
Installation steps

To install, follow the removal Procedure in reverse order..



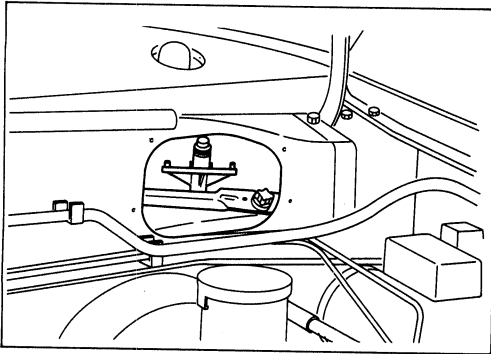
Important operations

1. Wiper arm assembly

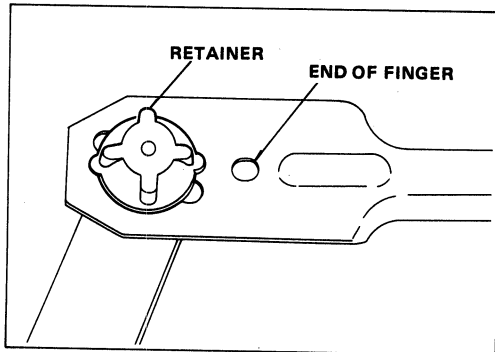


4. Cover ; work hole left

Remove the hole covers on the engine compartment side of the dash panel.

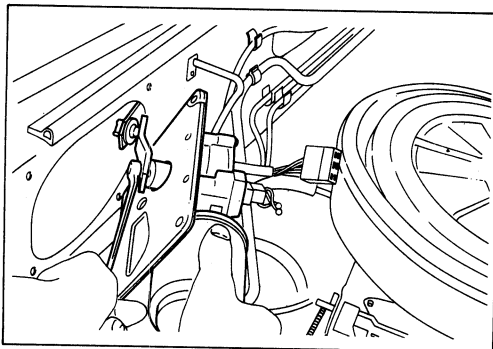


6. Wiper motors assembly with link assembly



7. Link joints ; retainer

Disengage the end of the finger on the link joint retainer from the hole in the link, then disconnect the link from the pivot arm by turning the retainer clockwise.





INSPECTION AND REPAIR

COMMUTATOR

Disassembly

1. Remove the two screws fixing the rotor cover. Remove the rotor cover together with the rotor by turning the cover clockwise.

(Remove the rotor carefully to prevent damaging the brushes.)

2. Pull the rotor out of the cover.

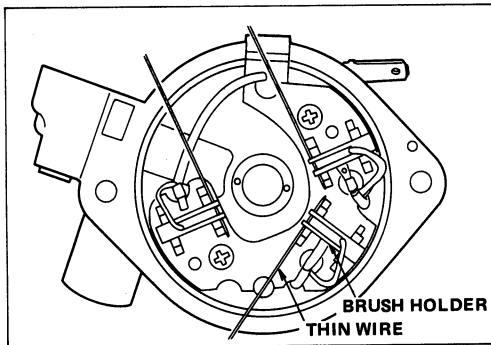
If the commutator has been fouled, remove the carbon from the grooves between the segments with a knife blade or other suitable tool and then and then, reface it with fine sand paper.



Reassembly

Set the brushes into position prior to installing the rotor in the motor gear case by placing a thin wire through the slot in the brush holder.

Insert the rotor in the cover. Place the rotor and cover assembly into the case. Push it in until the commutator reaches the brush positions. Remove the wire used in the previous step. Fasten the rotor with the cover.



BRUSHES AND BRUSH SPRINGS



Check and repair or replace the parts if any of the following conditions exists:

1. Brushes have poor contact with the commutator.
2. Brushes are chipped or worn.
3. Brush springs are broken or corroded.
4. Brush holders are corroded or distorted.

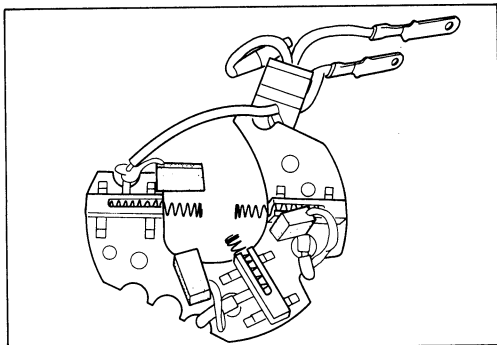


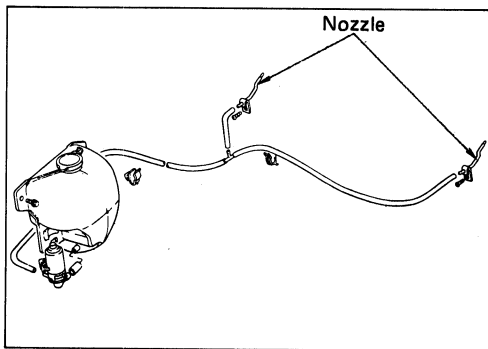
Self-parking device

If either of the following conditions exist, the contact points in the self-parking device are fouled or seized up and should be repaired or replaced.

1. The wiper motor does not stop and continues to run even when the switch is turned off.
2. The wiper motor stops immediately when the switch is turned off.

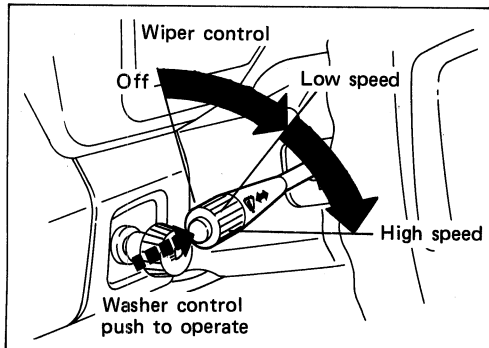
The windshield must be wet when testing the wiper.



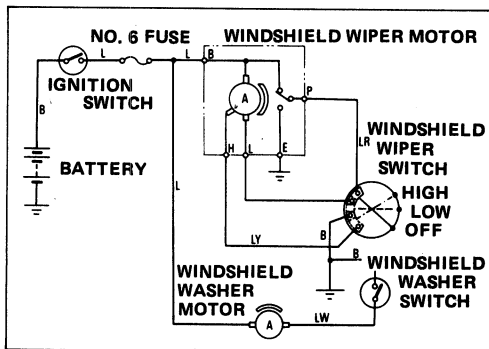


Washer nozzle adjustment

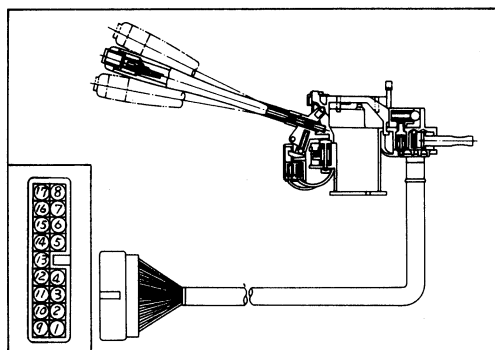
Nozzles should be adjusted so that the washing solution is sprayed to the uppermost area of the windshield. This will assure their effectiveness under most driving conditions.



Windshield wipers and washer switch



Circuits



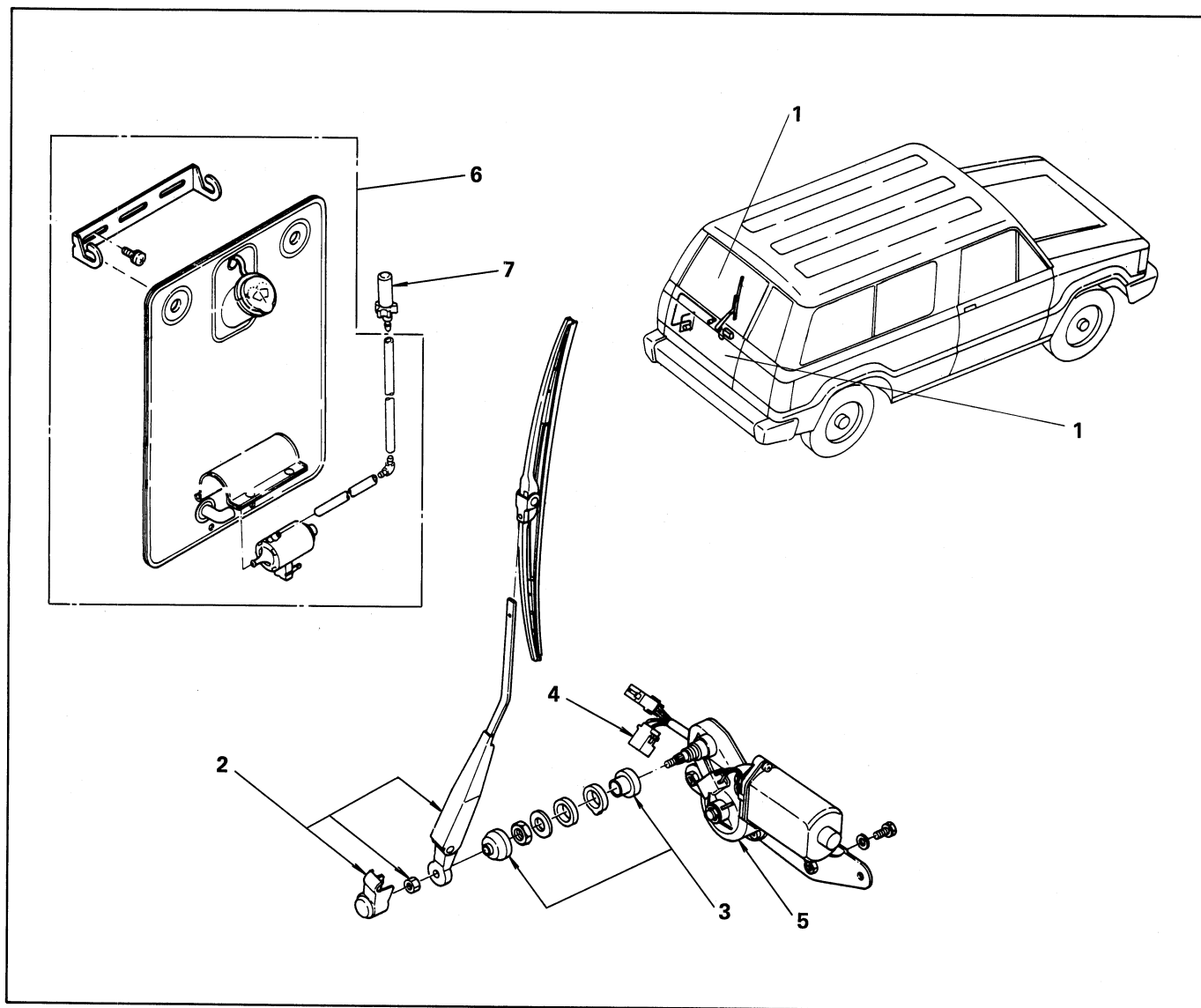
Cable color and No.	LR/⑧	LW/⑤	LY/⑥	B/⑨	LB/⑦
Switch position					
OFF	○ — ○				
LOW		○ — ○			
High			○ — ○		
Washer ON				○ — ○	

No.	Connection place	Color	Size
1	Turn Signal Lamp, LH	GB	0.5
2	Turn Signal Lamp, RH	GL	0.5
3	Turn Signal Flasher Unit	GW	0.5
4	Hazard Warning Flasher Unit	GY	0.85
5	Wiper Motor, Low	LW	0.85
6	Wiper Motor, High	LY	0.85
7	Washer Motor	LB	0.5
8	Self Parking	LR	0.85
9	Earth	B	0.85
10	Light control Switch	RW	1.25
11	—		
12	Head Light, Low Beam	RY	1.25
13	—		
14	Head Light, High Beam	R	1.25
15	—		
16	Circuit Breaker		
17	Horn	GR	0.85

REAR WIPER ASSEMBLY (IF SO EQUIPPED)



REMOVAL AND INSTALLATION



Removal steps

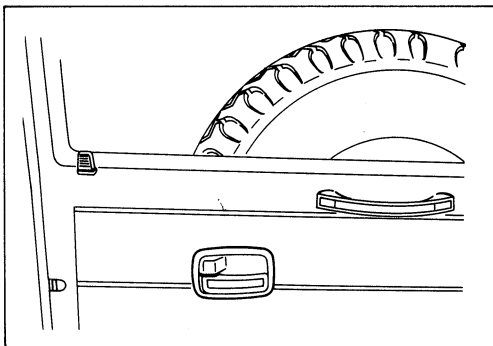
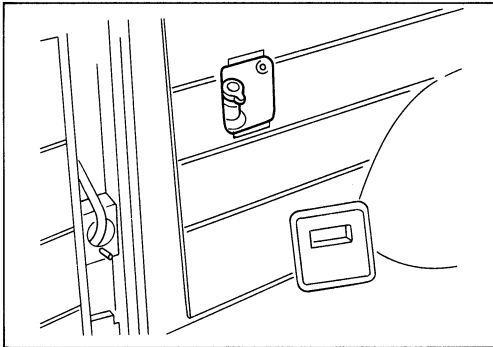
- ▲ 1. Pad assembly ; back door and left side and lock assembly rear door
2. Arm assembly
3. Attaching parts ; rear wiper
4. Connector ; wiring
5. Wiper motor assembly
6. Washer assembly
7. Nozzle assembly

Installation steps

To install, follow the removal procedure in reverse order.

**Important operation**

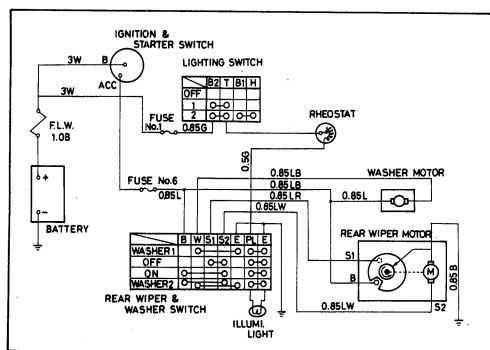
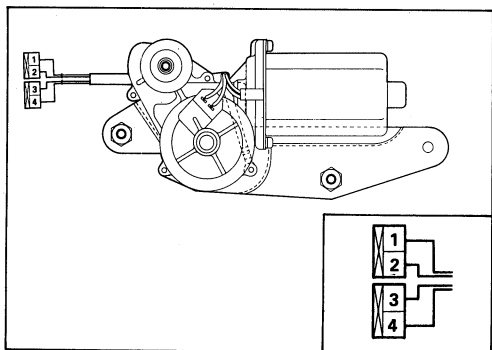
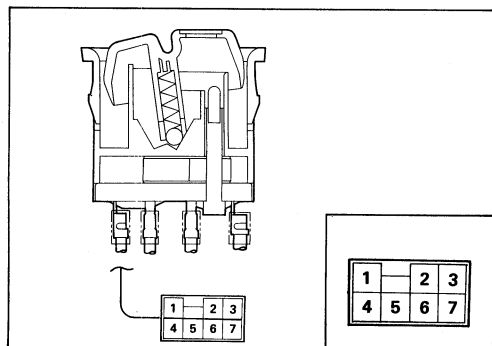
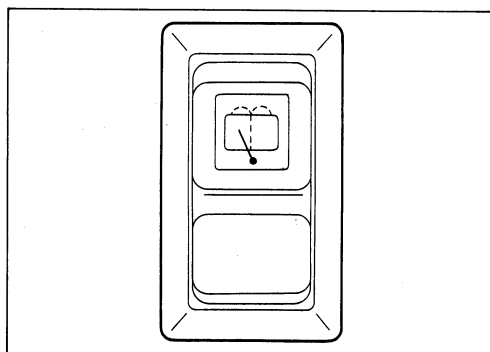
1. Pad assembly ; back door and left side and lock assembly rear door

**INSPECTION AND REPAIR****Commutator**

Refer to this Section
"WINDSHIELD WIPER"

Brushes and brush spring

Refer to this Section
"WINDSHIELD WIPER"



Rear wiper switch

No.	Connection place
1 (B)	Electrical source
2 (E)	Earth
3 (S2)	Wiper Motor — S2
4 (PL)	Indicator High
5 (W)	Washer Motor
6	—
7 (S1)	Wiper Motor

Rear wiper motor assembly

No.	Connection place
1 (E)	Earth
2 (S1)	Wiper motor — S1
3 (G2)	Wiper motor — S2
4 (B)	Electrical Source

Circuits

DIAGNOSIS (CHASSIS)

SPEEDOMETER DIAGNOSIS

Complaint	Correction
1. Speedometer inoperative	1. Inspection of inner cable. A. Check to see if the cable is properly connected to the speedometer and transmission unit. B. If the cable is connected properly, disconnect the cable at both ends and turn one end of inner cable with your fingers. See if the turning motion is carried to the other end of the inner cable. If cable does not turn at other end, it is broken and should be replaced. 2. If the inner cable is found to be free from troubles through the above tests A and B: Connect the cable to the speedometer and turn the other end of the cable with your fingers and see if the meter pointer moves. If the meter cable pointer does not move, the meter has internal trouble. 3. If no trouble has been found through the above tests, the speedometer gears are broken and should be replaced.
2. Movement of the meter pointer is sluggish and the pointer does not return when vehicle speed slows.	Insert a fine screwdriver or other suitable tool into the inner cable fitting hole in the rear face of the speedometer and turn it quickly in a counter-clockwise direction. If the meter pointer swings but does not return to position, oil is leaking into the speedometer unit.
3. Meter pointer dances or comes to stop at a point and does not move further in response to speed increase.	1. Check the speedometer cable for kinks and damage and repair or replace as necessary. 2. If the speedometer cable is free from trouble, the speedometer unit has internal trouble.
4. Odometer is inoperative.	Speedometer has internal trouble. Overhaul or replace the speedometer unit.
5. Speedometer indication is incorrect.	Check the speedometer drive gear.

FUEL GAUGE AND TEMPERATURE GAUGE DIAGNOSIS

Complaint	Cause	Correction
1. Meter pointer moves beyond the scale when the ignition switch is turned on.	1. Voltage regulator is not functioning normally.	Measure the resistance across the secondary terminal of the voltage regulator and the body. If the measured resistance deviates greatly from the standard resistance of 110Ω , the voltage regulator is faulty and should be replaced.
	2. Lead wire or internal wiring of the meter shorted.	Turn on the ignition switch with the lead wires disconnected from the meter unit and see if the meter pointer moves. If the meter pointer moves, the lead wire or the internal wiring of the meter should be repaired or replaced.
	3. Meter unit has an internal short-circuit.	Disconnect the lead wires from the meter unit and measure the resistance across the terminal and body. A) The internal resistance of the unit varies from 125Ω to 15Ω when the position of the float is switched from "E" to "F". B) The internal resistance of the thermometer unit is about 146.6Ω or higher when checked at a water temperature of 60°C (140°F). If the measured resistances deviate greatly from the above values, the unit is defective and should be replaced.
2. Meter pointer inoperative.	1. Voltage regulator defective.	Disconnect the wiring between the secondary terminal of the voltage regulator and meter and connect a voltmeter between the secondary terminal of the voltage regulator and the body. The voltage regulator is normal if the voltmeter pointer swings across the 7.0V point of the scale intermittently when the ignition switch is turned on.
	2. Unit has internal trouble.	Check the unit by following the steps outlined in A and B above.
	3. Meter has internal trouble.	Disconnect both terminals from the meter and measure the resistance across the meter. Replace the meter terminals and the meter if the measured resistance deviates greatly from the value given below. Fuel Gauge: about 25Ω . Temperature Gauge: about 25Ω
	4. Lead wires broken.	Disconnect the lead wires from the tank unit and connect a voltmeter to the lead wires and check for continuity.

BACK-UP LAMP SWITCH DIAGNOSIS

Complaint	Correction
1. Back-up lamps do not turn on when transmission is shifted into reverse.	1. Check the fuse. 2. Check the lamp bulb for a burned out filament and the bulb socket for poor contact. 3. Check the wiring between the fuse box and the switch and between the switch and the lights for an open circuit or poor contact. 4. If the lamp bulbs, sockets and wiring are OK, make a continuity test on the switch using a tester. If the test does not indicate continuity when shifted into reverse, the switch is faulty and should be replaced.
2. Back-up lamps remain on.	1. Switch is defective.

STOP LAMP SWITCH DIAGNOSIS

Complaint	Correction
1. Both stop lamps do not turn on.	1. Check the fuse. 2. Check the circuit in the following manner: Disconnect the wiring at the connector and connect the lamps directly to the power terminal by using a jumper cable and see if the lamps turn on. The switch is defective if the lamps turn on. 3. Check the wiring between the fuse and switch and between the switch and lamps for an open circuit or poor contact.
2. Stop lamp on side inoperative.	Check the lamp bulb for a burned out filament and the bulb socket for poor contact.
3. Stop lamps remain on.	Check the position of the stop lamp switch by referring to the Section 00 "GENERAL INFORMATION", Brake Pedal Adjustment. If the switch position is correct, the switch is probably defective.

WINDSHIELD WIPER DIAGNOSIS

Complaint	Correction
1. Wiping action is rough.	Check the moving parts of the linkage for wear and replace the linkage as necessary.
2. Wiping action is sluggish.	1. Check the connector grounding cable. 2. Remove the wiper motor and linkage from the vehicle and manually operate the linkage. If the linkage is twisted or the moving parts are seized up and movement of the linkage is rough, replace the linkage. 3. If the linkage is free from trouble, the wiper motor is faulty and should be repaired or replaced.
3. Wiper motor inoperative.	Check the circuit for an open circuit and the connector and the grounding cable for poor connections. Also check the wiper switch for internal trouble by measuring the voltage at the connector. If the wiring is normal, the wiper motor is out of order and should be repaired or replaced.
4. Wiper motor does not stop when the switch is turned off.	1. Remove the motor cover and check the contact points in the self-parking device. If the contact points are seized up, dress the points with fine sand paper. 2. If the self-parking device is normal, check and replace the wiper switch if found to be bad.
5. Wiper motor stops immediately when the switch is turned off	Check the contact points in the self-parking device for fouling and dress with fine sand paper as necessary.
6. Poor wiping action.	Check and replace the wiper blades and wiper arms if found to be bad.

WINDSHIELD WASHER DIAGNOSIS

Complaint	Correction
1. Washing solution is not pumped out when the washer switch is turned on.	1. Check the fuse. 2. Check the circuit for a broken cable or poor connections. 3. Check the washer pump operation. 4. If no trouble is found through the above checks, the nozzles or the piping between the washer pump and washer nozzles are probably plugged.
2. Pressure of the washing solution is too low.	1. Check the nozzles for obstructions. 2. If the nozzles are free from obstructions, the washer pump is probably defective.

OIL PRESSURE SWITCH DIAGNOSIS

Complaint	Correction
1. The oil pressure indicator lamp does not turn on when the ignition switch is turned on.	1. Check the fuse. 2. Check the lamp bulb for a burned out filament and the bulb socket for poor contact. 3. Check the wiring between the oil pressure switch and the indicator lamp; and between the indicator lamp and the ignition switch for broken cables or poor connections. 4. If the lamp bulb and the wiring are normal, make a continuity test on the pressure switch with a tester.
2. The indicator lamp turns on when the engine is running.	1. Check the wiring between the oil pressure switch and the indicator lamp for grounding. 2. If the wiring is normal, oil pressure switch is probably at fault.

PARKING BRAKE SWITCH AND OIL LEVEL SWITCH CIRCUIT DIAGNOSIS

Complaint	Correction
1. The indicator lamp remains out when the parking brake lever is set or when the brake line is defective.	1. Check the fuse. 2. Check the lamp bulb for a burned out filament and the wiring for an open circuit a poor connections. 3. If no trouble is found through checks 1. and 2., the switch is probably defective and should be replaced.
2. The indicator lamp does not go out when the parking brake lever is released and the brake line is functioning properly.	1. Check the wiring between the lamp and the switch for grounding. 2. If the wiring is normal, the switch is probably defective and should be replaced.

TURN SIGNAL SWITCH DIAGNOSIS

Complaint	Correction
1. Lights remain on and do not flash.	Replace the flasher unit.
2. Only one light remains out.	Check the lamp bulb for a burned out filament and the wiring for an open circuit or the bulb socket for poor contact.
3. Lights on one side in-operative.	If the wiring is not defective, chances are that the turn signal switch is defective. Disconnect the switch wiring at the connector and check the continuity between the switch terminal with the switch lever moved to the proper position.
4. All lamps inoperative.	1. Short out the B and L terminals of the flashing unit and turn on the switch and see if the lamps turn on. If the lights turn on, the flasher unit is probably defective. 2. If the lamps do not turn on when the switch is turned on with the B and L terminals shorted, the switch is defective and should be replaced. 3. If the lamps turn on when the switch is turned on with the lead wire GB, GL and GY the hazard warning lamp switch shorted, the hazard warning lamp switch is probably bad.
5. Flashing rate is too fast (or too slow)	Check to see if the lamp bulbs are of the specified wattage. If the lamp bulbs are normal, the flasher unit is probably defective and should be replaced.
6. All the lamps turn on weakly.	Lamp circuit is poorly grounded.

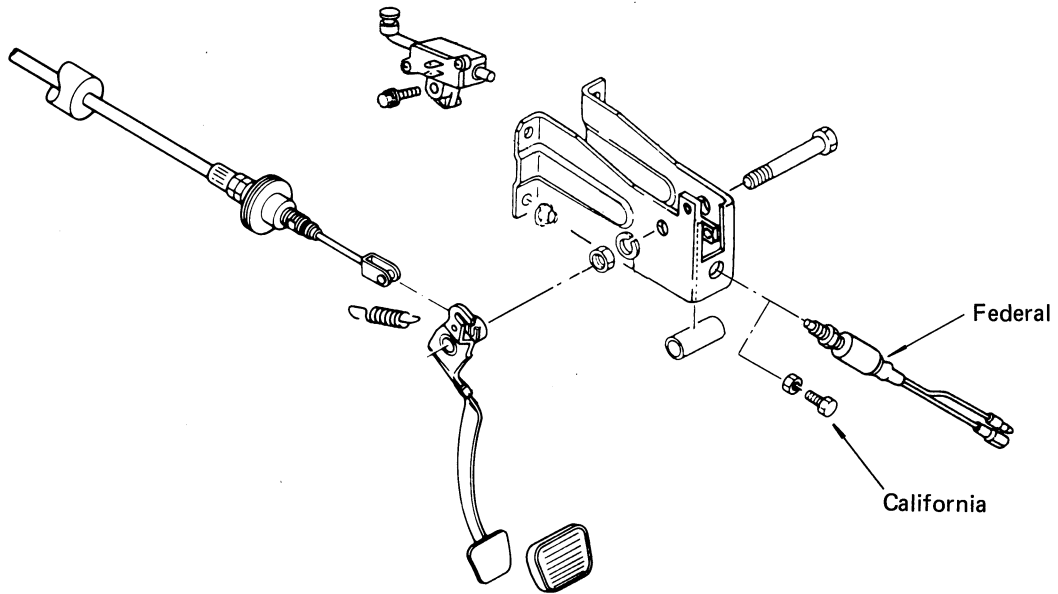
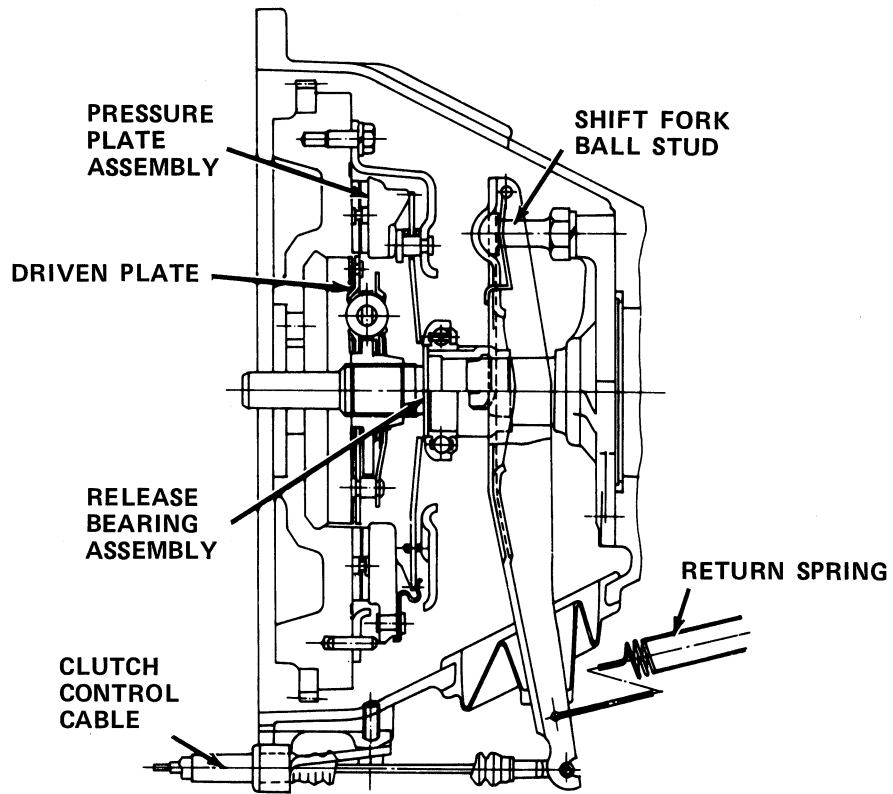
SECTION 05A

CLUTCH

INDEX

CONTENTS	PAGE
General description	05A— 2
Main data and specifications	05A— 3
Major parts ; fixing nuts and bolts	05A— 3
Clutch assembly	05A— 4
Clutch control	05A—11
Clutch cable	05A—12
Diagnosis	05A—14
Special tools	05A—18

GENERAL DESCRIPTION

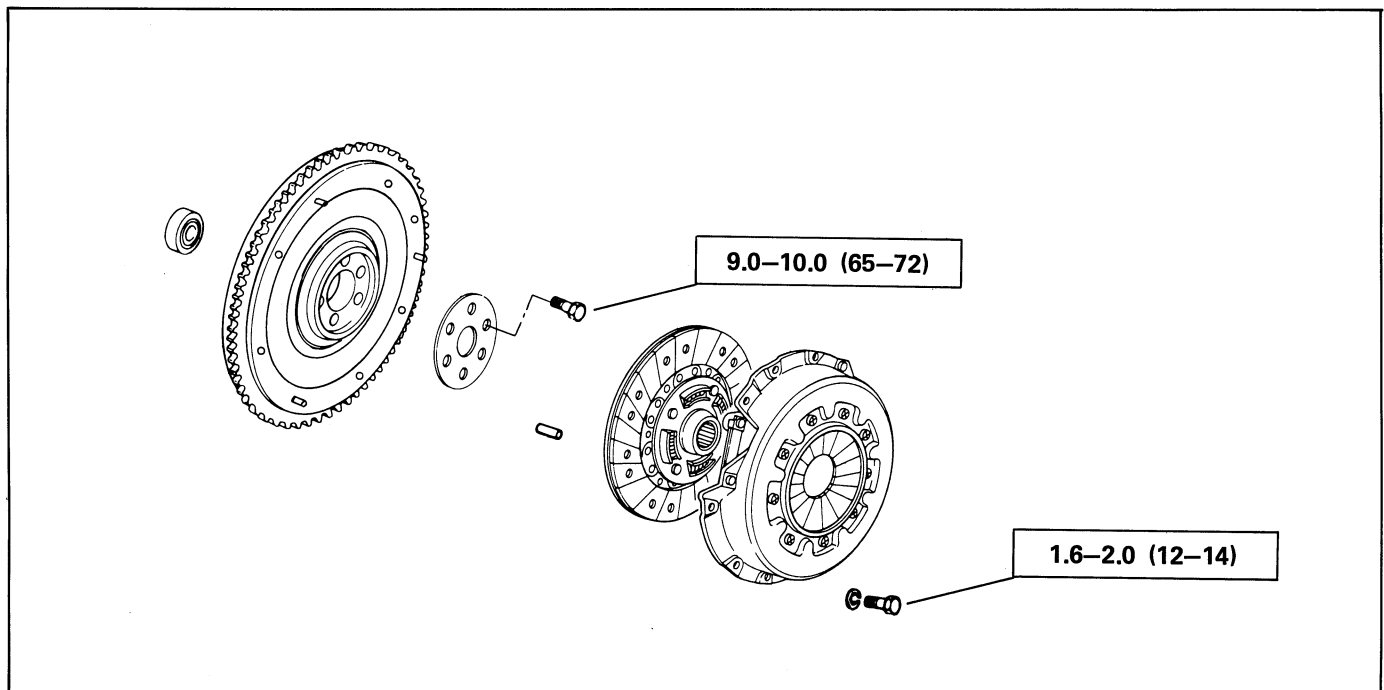


MAIN DATA AND SPECIFICATIONS

Type		Dry single plate type with diaphragm
Size	mm(in.)	215 (8.47)
Clamping force	kg(lbs.)	380 (837.76)
Outside dia x inside dia x thickness	mm(in.)	215 x 150 x 3.5 (8.47 x 5.91 x 0.14)
Thickness of driven plate		
When free	mm(in.)	8.3 (0.33)
When compressed	mm(in.)	7.8 (0.31)
Facing material		Woven SF105M
Total friction area	cm ² (in ²)	186 x 2 (28.83 x 2)
Clutch control type		Mechanical
Clutch pedal free play	mm(in.)	14 (0.55)
Clutch pedal height	mm(in.)	226 — 236 (8.9 — 9.3)

MAJOR PARTS ; FIXING NUTS AND BOLTS

kg-m(ft.lbs.)

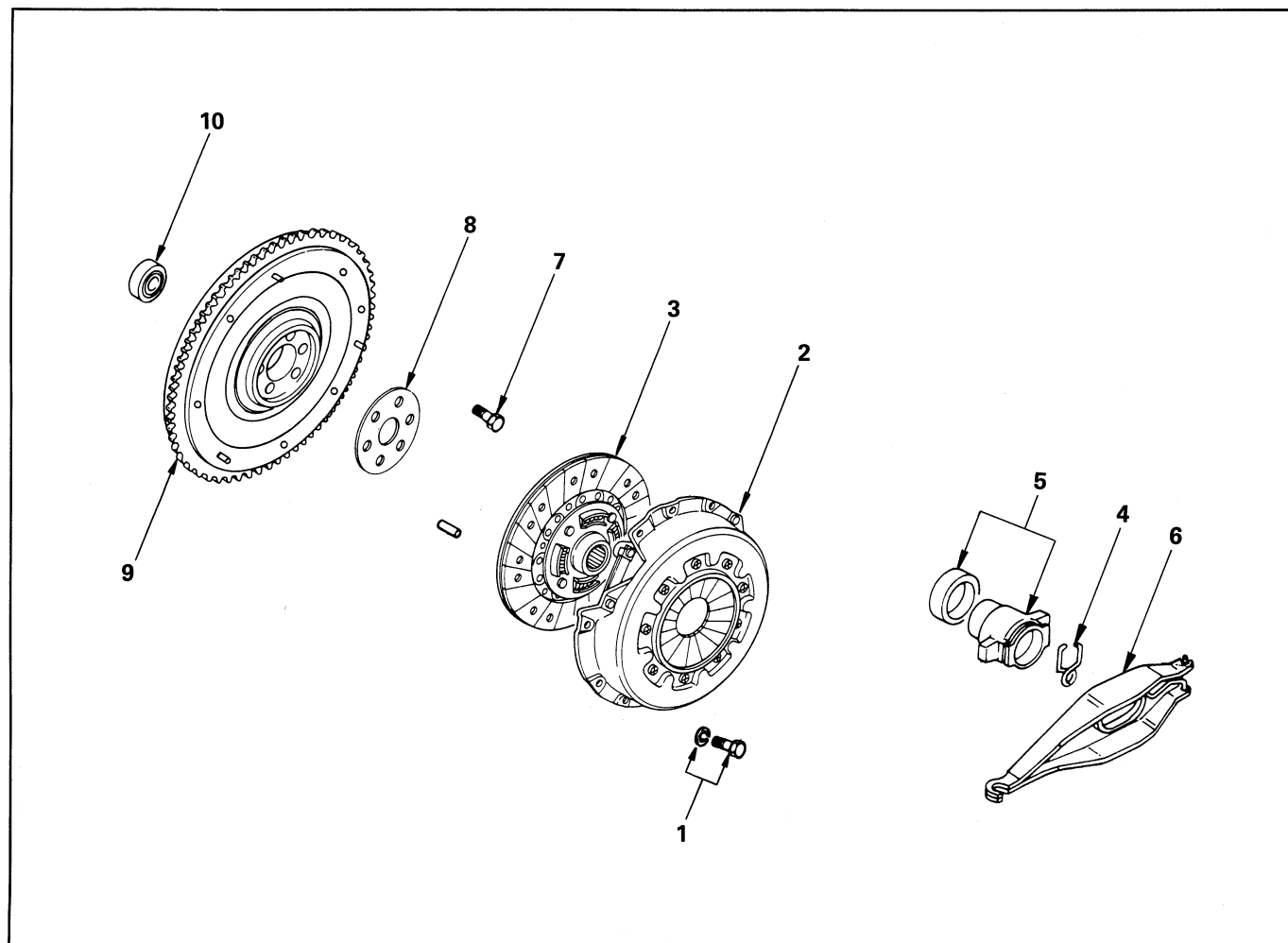


CLUTCH ASSEMBLY



DISASSEMBLY

Refer to "Transmission with transfer case Removal Procedure" in this section.

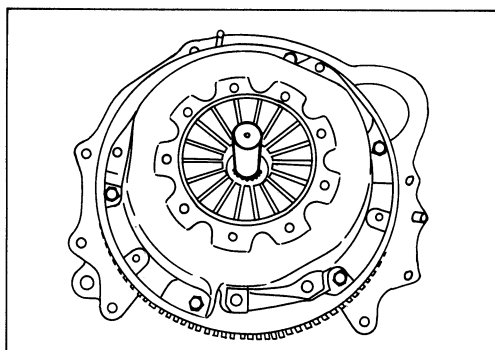


Disassembly steps

- | | |
|---------------------------------------|---------------------------------|
| 1. Bolts | 6. Fork assembly; clutch shift |
| ▲ 2. Plate assembly; clutch, pressure | 7. Bolts; flywheel fixing |
| 3. Disc assembly; clutch driven | 8. Washer; flywheel |
| 4. Spring | 9. Flywheel assembly |
| 5. Collar; shift, with bearing | ▲ 10. Bearing; ball, crankshaft |



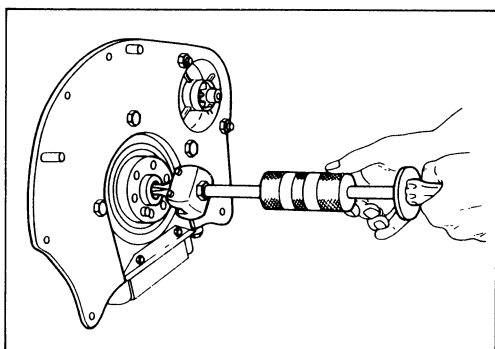
Important operations



2. Plate assembly ; clutch pressure

Aligner : J-24547

Do not permit oil or grease to come in contact with the working face of the clutch driven plate.



10. Bearing ; ball, crankshaft

Do not remove unless absolutely necessary.

Remover : J-23907



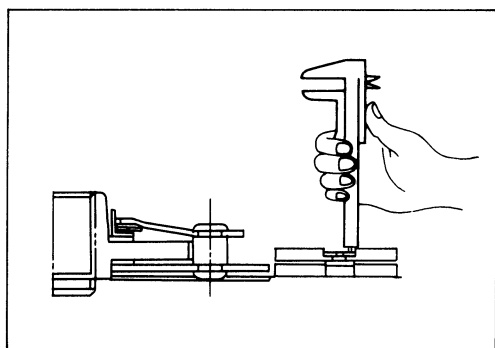
INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



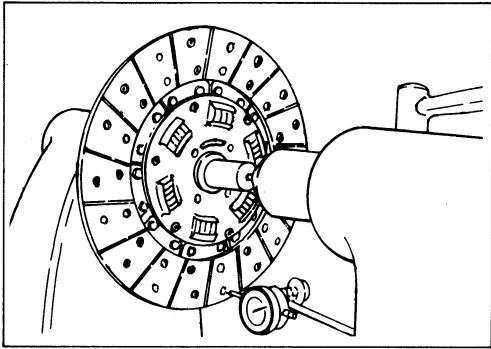
Driven plate

Check the surface of the facing for cracks, hardening due to heat, and contamination with oil or grease.
Replace if play is found in the damper springs.



Depression of rivet head from surface

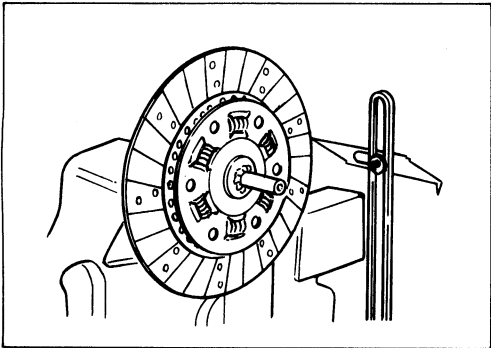
mm(in.)	
Standard	Limit
1.2 (0.047)	0.2 (0.008)



Driven plate warpage

mm(in.)

Standard	Limit
0.7 (0.028)	1.0 (0.039)



Wear in splines

Install the driven plate on the top gear shaft splines and check the amount of wear at the circumference of the driven plate.

mm(in.)

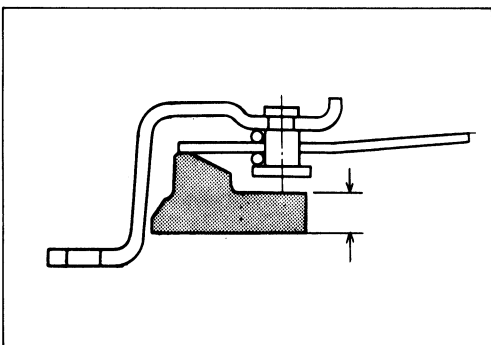
Standard	Limit
0.5 (0.020)	1.0 (0.039)



Pressure plate assembly

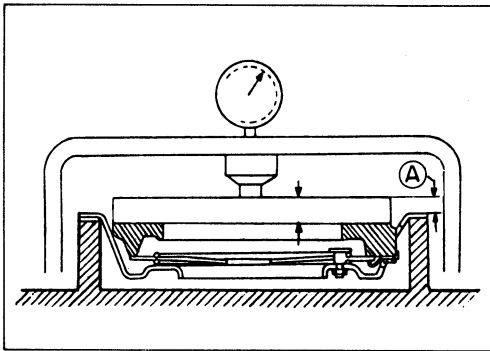
Check the cover for cracks and distortion, and the diaphragm spring for heat distortion, loosened rivets.

Check the wire ring for wear.



Pressure plate thickness

Standard	mm(in.)	13 (0.51)
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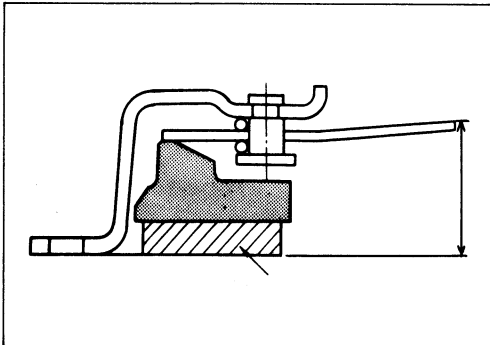


Measurement of damping force

Invert the pressure plate assembly and place A new clutch disc or A plate of 7.8 mm (0.307 in.) thickness over the pressure plate.

Compress the pressure plate assembly to installation position (distance A becomes zero) and take the reading of the gauge.

Clamping force	kg(lbs.)	380 (837.76)
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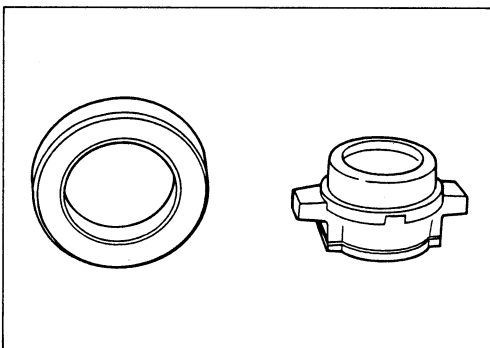


Height of diaphragm spring fingers

Compress the diaphragm spring with a 7.8 mm (0.307 in.) spacer positioned over the pressure plate.

Measure the height of the fingers at their tip ends when the spring is compressed.

Standard	mm(in.)	32 - 34 (1.26 - 1.34)
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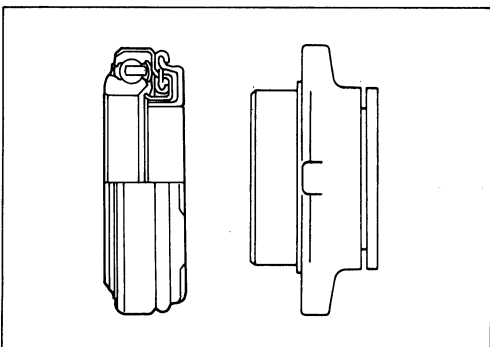
Shift collar — bearing replacement

Visually check the parts for wear or other abnormal conditions prior to disassembly.

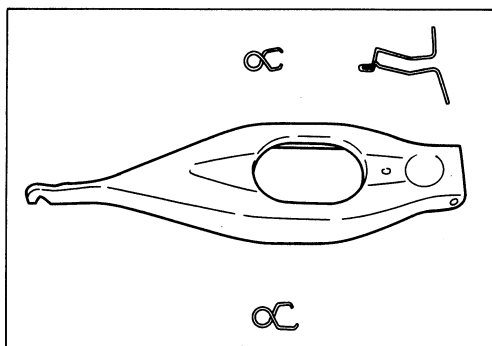
When clutch operation is accompanied by abnormal noise or binding and replacement is necessary, remove the unit using special tools.

Puller : J-22888

Adapter : J-2241-11



Install the parts as illustrated after applying wheel bearing grease or multi-purpose type grease (NIGI No. 2 or No. 3).

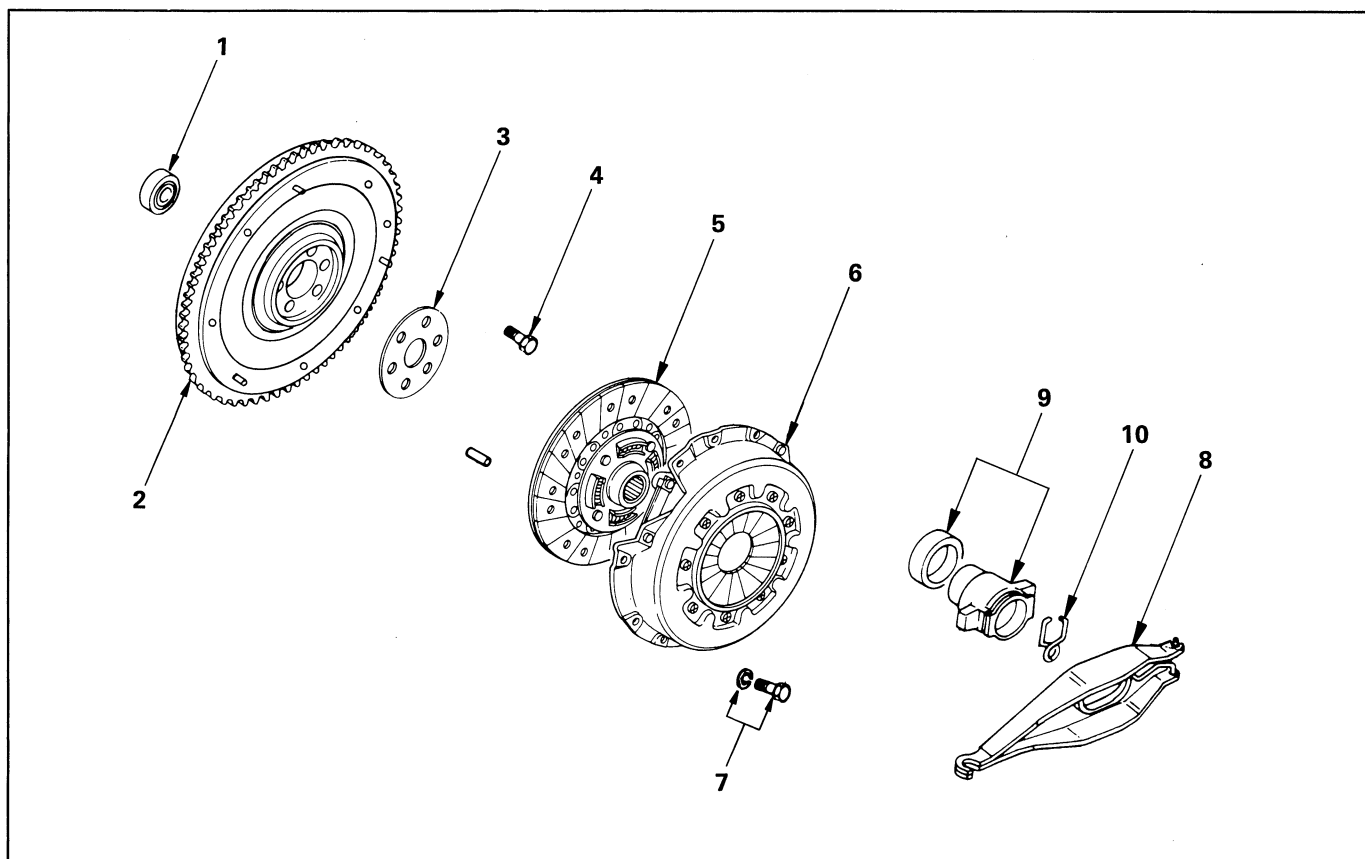


Shift fork

Replace the withdraw lever when a considerable amount of wear or damage is found on the faces in contact with the shift block and pivot.



REASSEMBLY

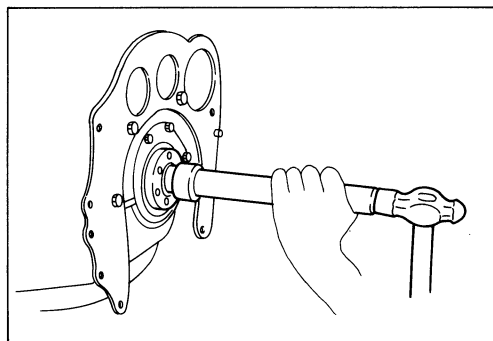


Reassembly steps

- | | |
|-------------------------------------|--------------------------------------|
| ▲ 1. Bearing ; ball, crankshaft | 6. Plate assembly ; clutch, pressure |
| 2. Flywheel assembly | ▲ 7. Bolts |
| 3. Washer ; flywheel | ▲ 8. Fork assembly ; clutch shift |
| ▲ 4. Bolts ; flywheel fixing | 9. Collar ; shift, with bearing |
| ▲ 5. Disc assembly ; clutch, driven | 10. Spring |



Important operations



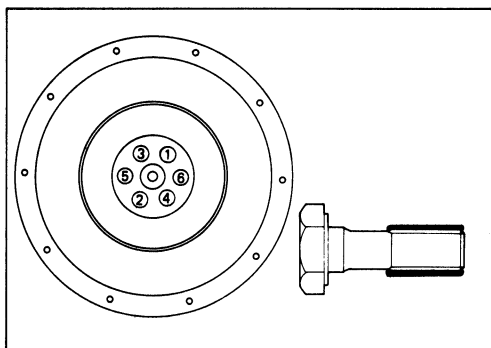
1. Bearing ; ball, crankshaft

Clean and lubricate with wheel bearing grease or multi-purpose type grease (NLGI No. 2 or 3)

Installer : J-26516-A

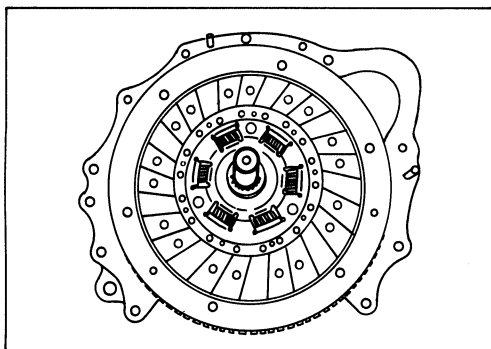
Grip : J-8092





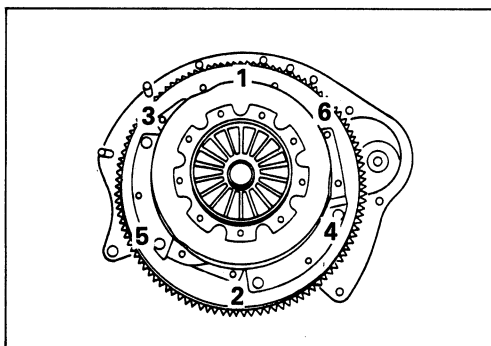
4. Bolt ; flywheel fixing

Torque	kg-m(ft.lbs.)	9.0 — 10.0 (65 — 72)
--------	---------------	----------------------



5. Disc assembly ; clutch, driven

Aligner : J-24547



7. Bolt

Tighten the bolts holding the pressure plate assembly in the sequence specified.

Torque	kg-m(ft.lbs.)	1.6 — 2.0 (12 — 14)
--------	---------------	---------------------



8. Fork assembly ; clutch shift

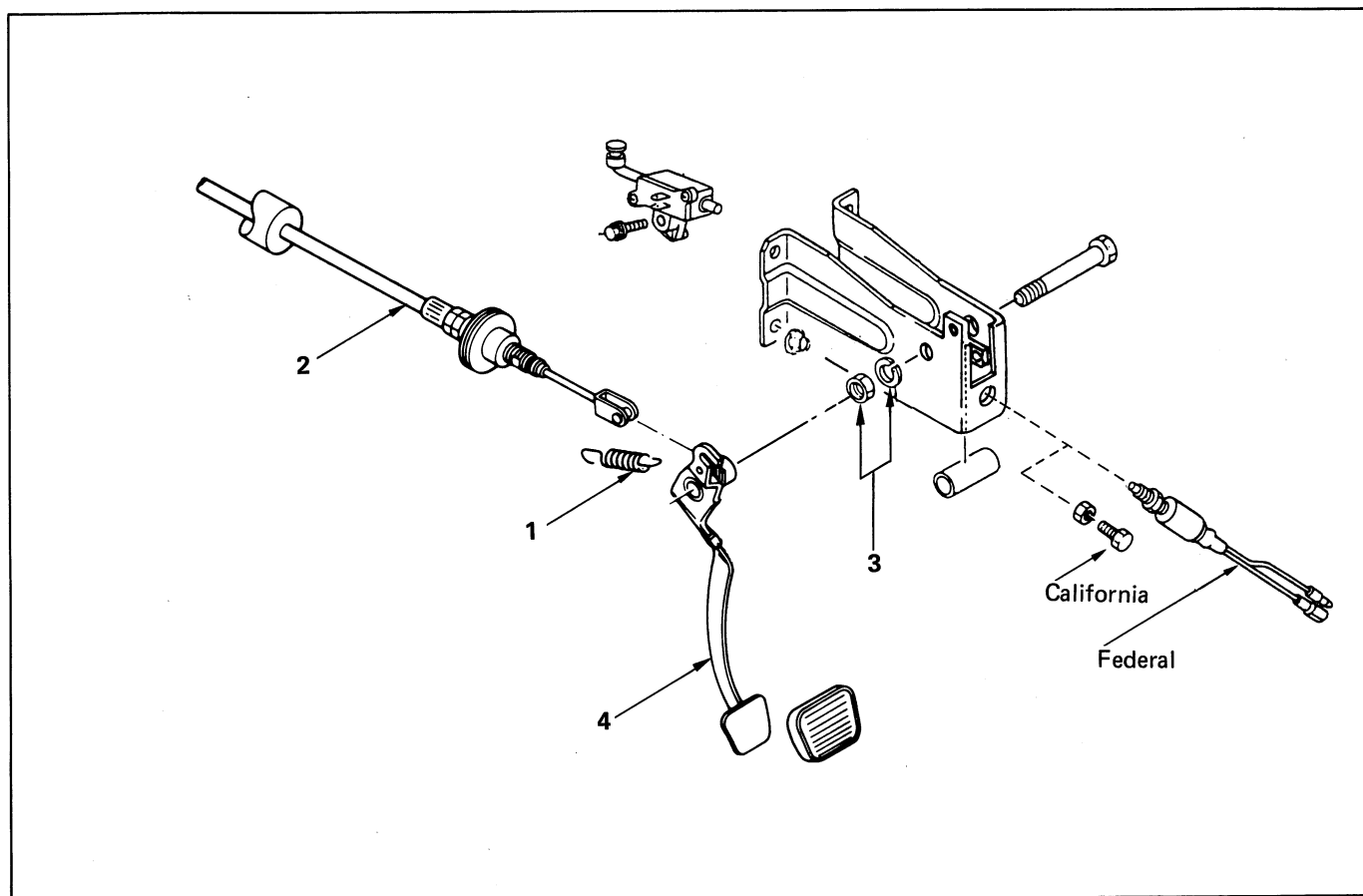
Lubricate with wheel bearing grease or multi-purpose type grease (NLGI No. 2 or 3).

Refer to "Transmission with transfer case Installation Procedure" in this section.

CLUTCH CONTROL



DISASSEMBLY



Disassembly steps

1. Return spring
2. Clutch cable
3. Snap pin and washer
4. Clutch pedal



INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



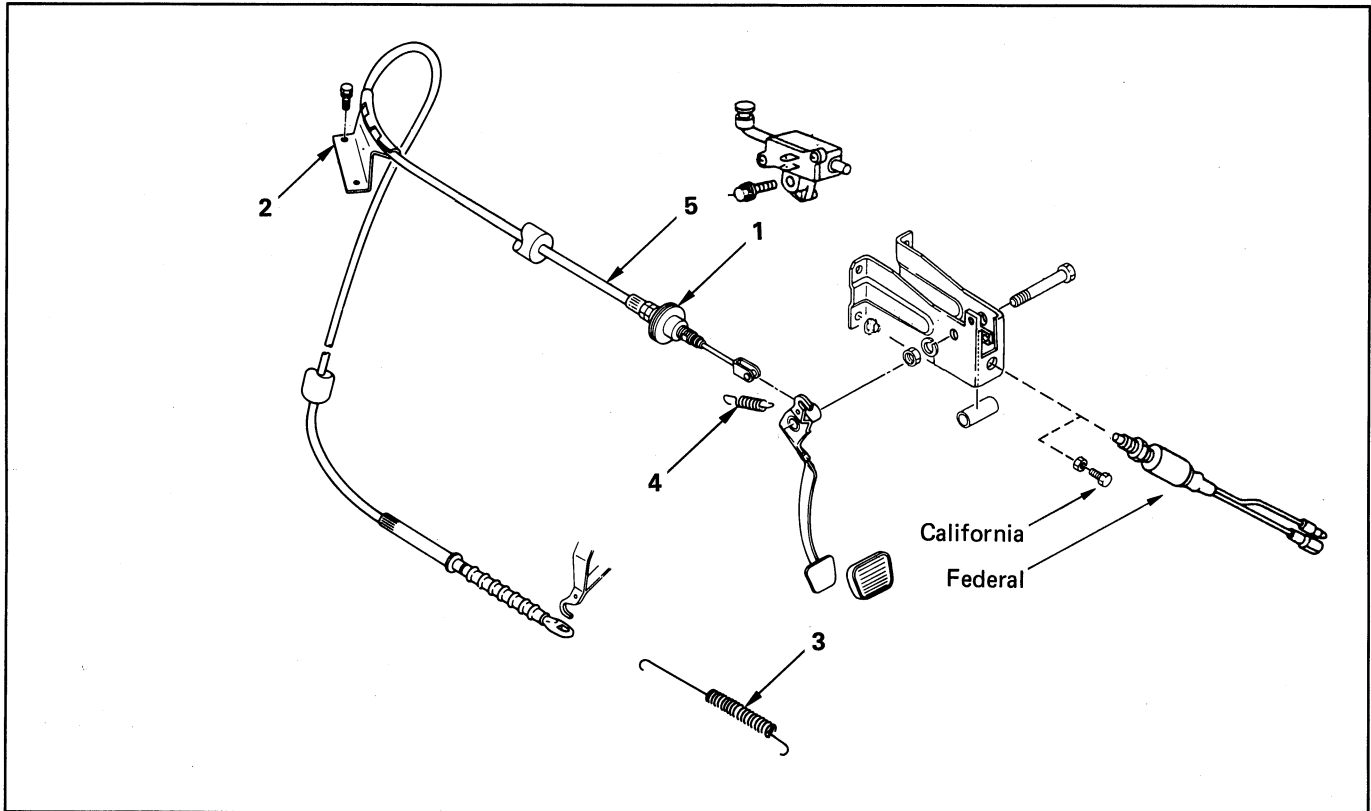
REASSEMBLY

To assemble, follow the disassembly procedures in reverse order.

CLUTCH CABLE



REMOVAL AND INSTALLATION



Removal steps

1. Clutch cable lock and adjusting nuts
2. Clutch cable clip
3. Return spring from shift fork end
4. Return spring from clutch pedal
5. Clutch control cable

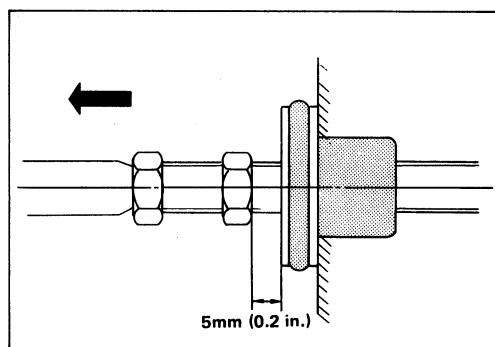
Installation steps

5. Clutch control cable
4. Return spring from clutch pedal
3. Return spring from shift fork end
2. Clutch cable clip
1. Clutch cable lock and adjusting nuts



INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



Adjustment

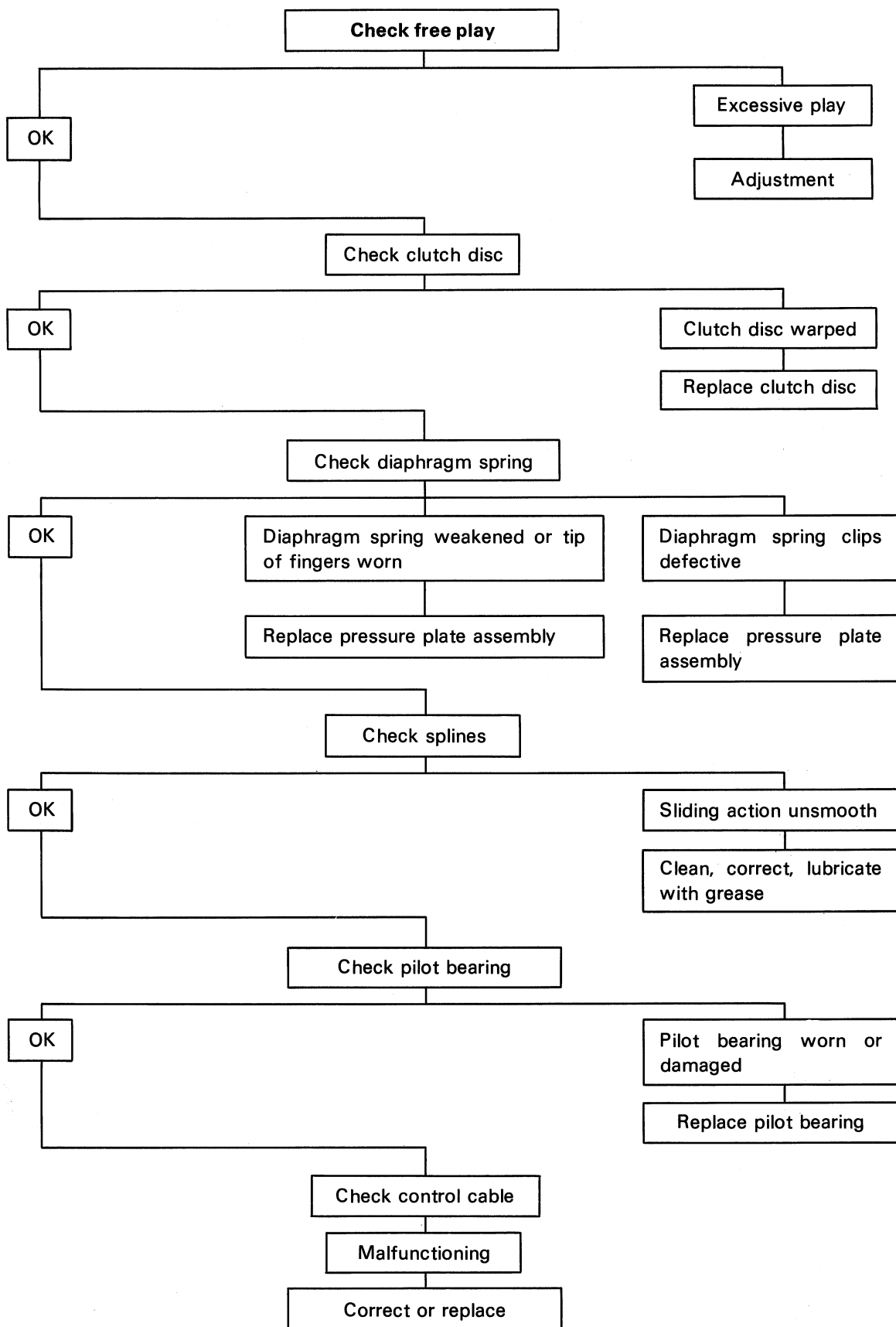
Clutch pedal height mm(in.)		206 — 216 (8.12 — 8.51)
Play	mm(in.)	5 (0.2)

Adjustment of clutch cable

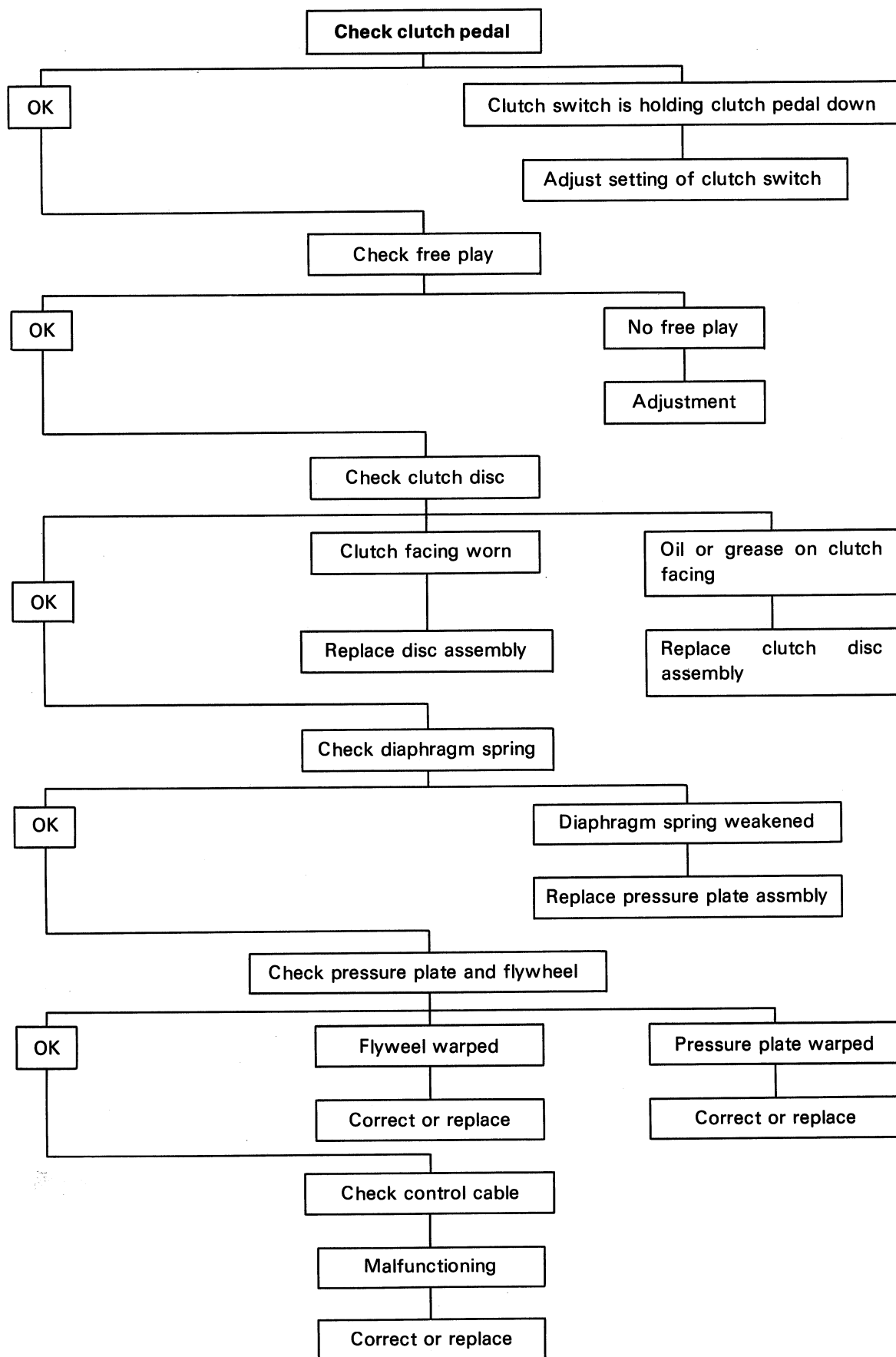
1. Pull the outer cable all the way forward and turn in the adjusting nut until the washer damper rubber is brought into contact with the dashboard.
2. Depress and release the clutch pedal repeatedly.
3. Pull the outer cable forward again and fully tighten adjusting the nut, and then back off to provide play of 5 mm (0.2 in.).
4. Release the outer cable and fully tighten the lock nut.

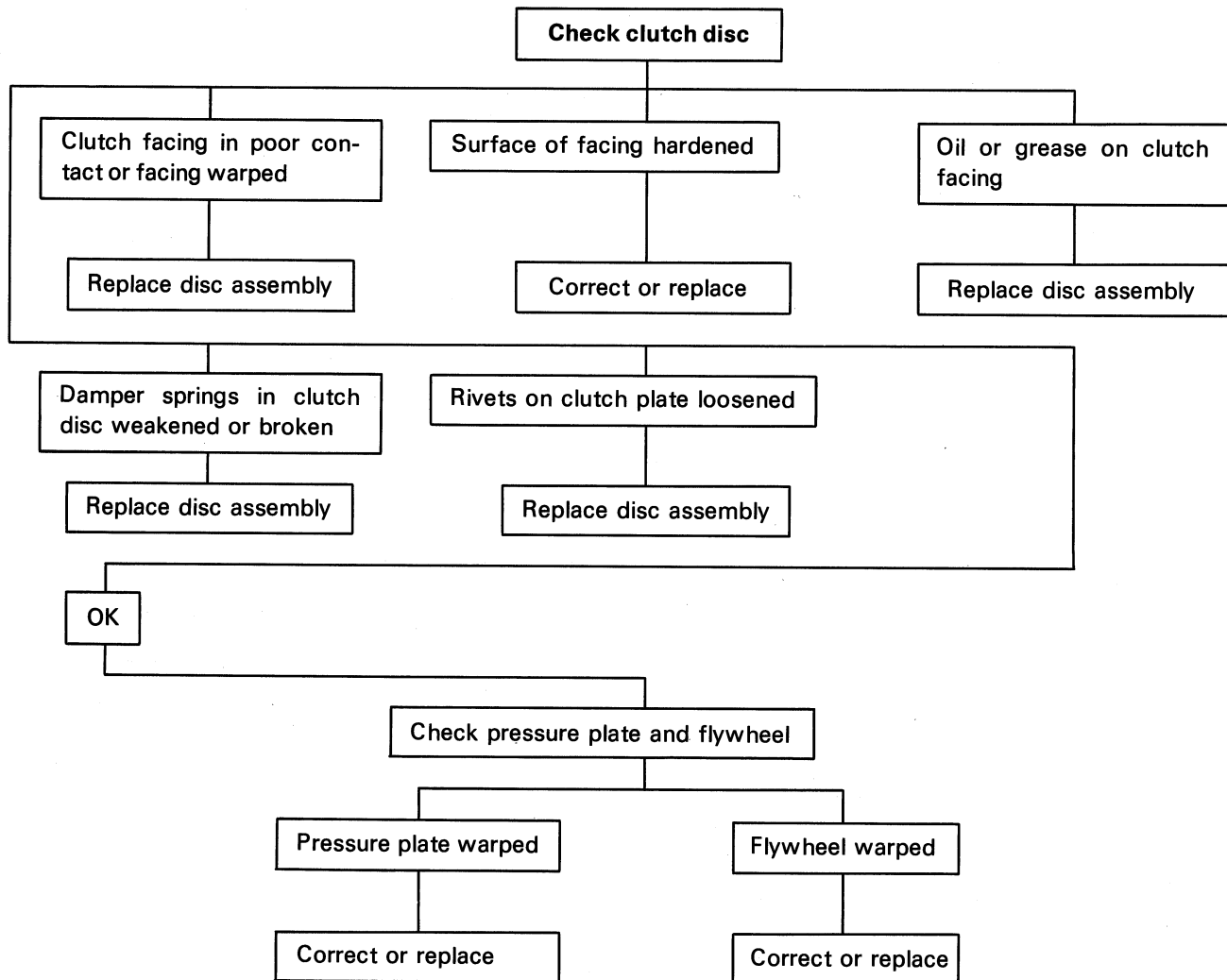
DIAGNOSIS

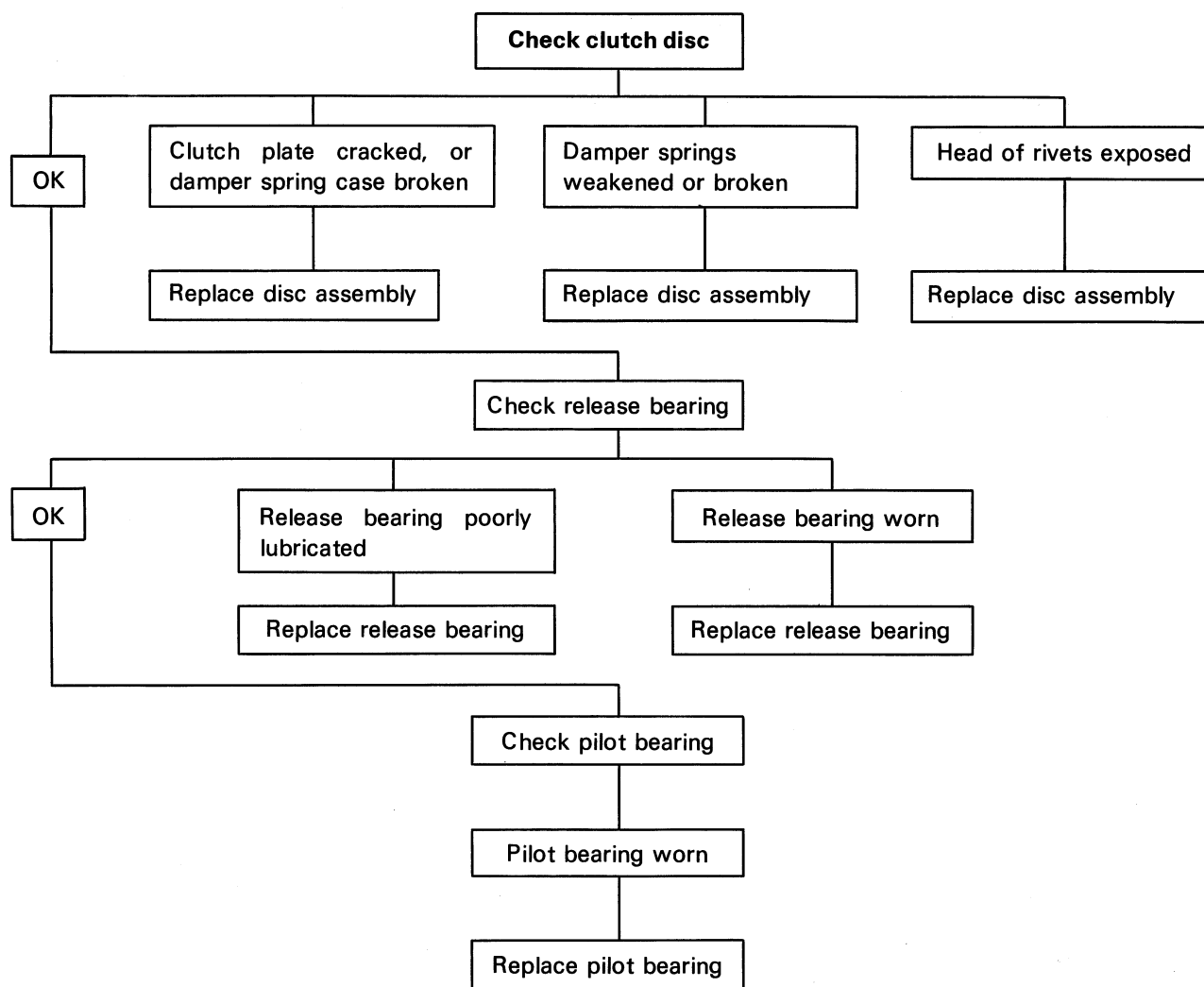
CLUTCH DRAGGING (GEARSHIFTING IS ACCOMPANIED BY GEAR GRATING NOISE)



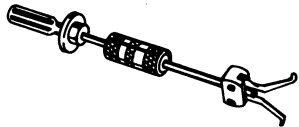
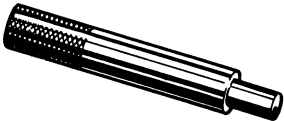
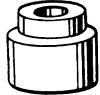
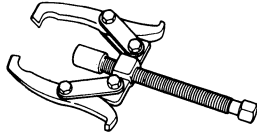
CLUTCH SLIPPAGE



CLUTCH CHATTER (BODY VIBRATES WHEN CLUTCH IS PARTIALLY ENGAGED WHEN ACCELERATING)

CLUTCH NOISY (DETERMINE CAUSE OF NOISE BY CHECKING WHETHER OR NOT CLUTCH MAKES NOISE WHEN DISENGAGED OR ENGAGED)

SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-23907	Pilot bearing remover
		J-24547	Drive plate aligner
		J-26516-A	Crankshaft pilot bearing installer
		J-2241-11	Release bearing puller adapter
		J-22888	Release bearing puller
		J-8092	Grip

SECTION 05

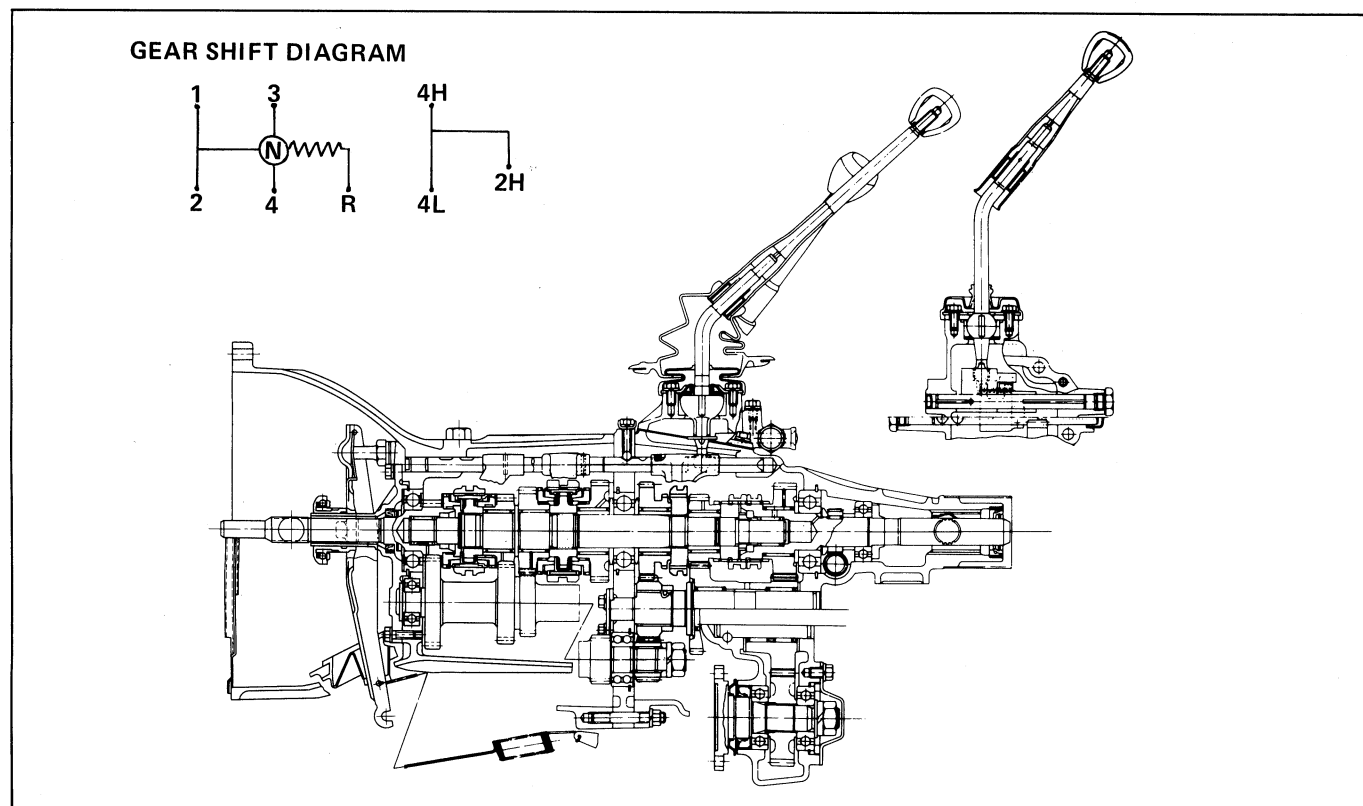
TRANSMISSION WITH TRANSFER CASE

INDEX

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General Description	05- 2
Main data and specifications	05- 2
Major parts ; fixing nuts and bolts	05- 3
Removal and installation	05- 4
Disassembly	05- 7
Inspection and repair	05-18
Reassembly	05-24
Diagnosis	05-41
Special tools	05-42

GENERAL DESCRIPTION

On the ISUZU KB82 model, the transfer mechanism is built into the rear part of the transmission assembly.

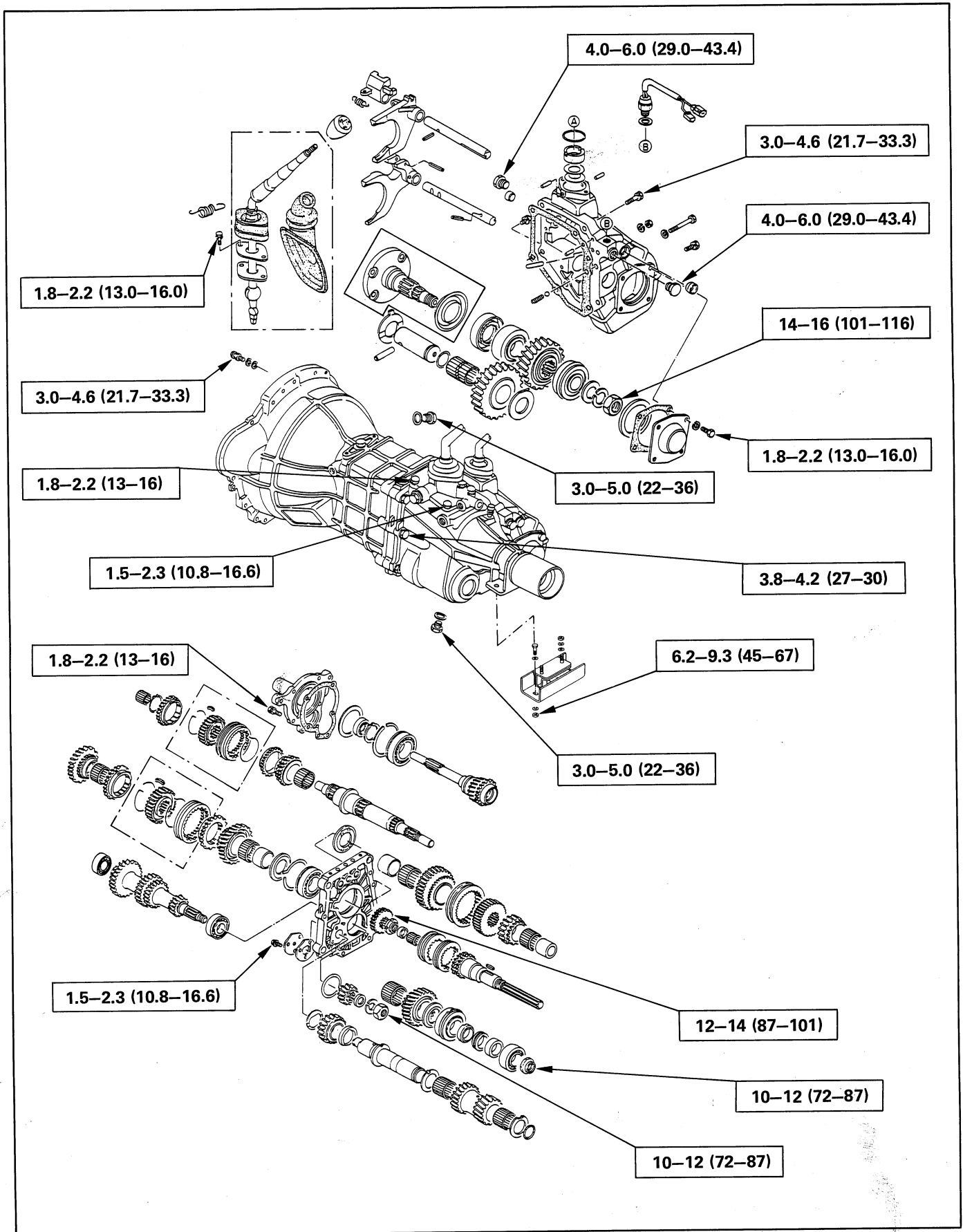


MAIN DATA AND SPECIFICATIONS

Model	MSG Transmission	Transfer Case
Type	Fully synchronized 4-forward gears with constant mesh type reverse gear.	Constant mesh type gears shifting between the 2 and 4 wheel drive mode. Movement of the two speed transmission between 'low' and 'high' is possible during 4 wheel drive operation.
Control method	Direct control with the gear shift lever on floor.	Direct control with the gear shift lever on the floor.
Gear ratio	1st 3.785 2nd 2.165 3rd 1.413 4th 1.000 Rev. 3.720	High 1.000 Low 1.870
Speedometer gear ratio	6/20	
Oil Capacity	2.5L(0.66 gal.)	

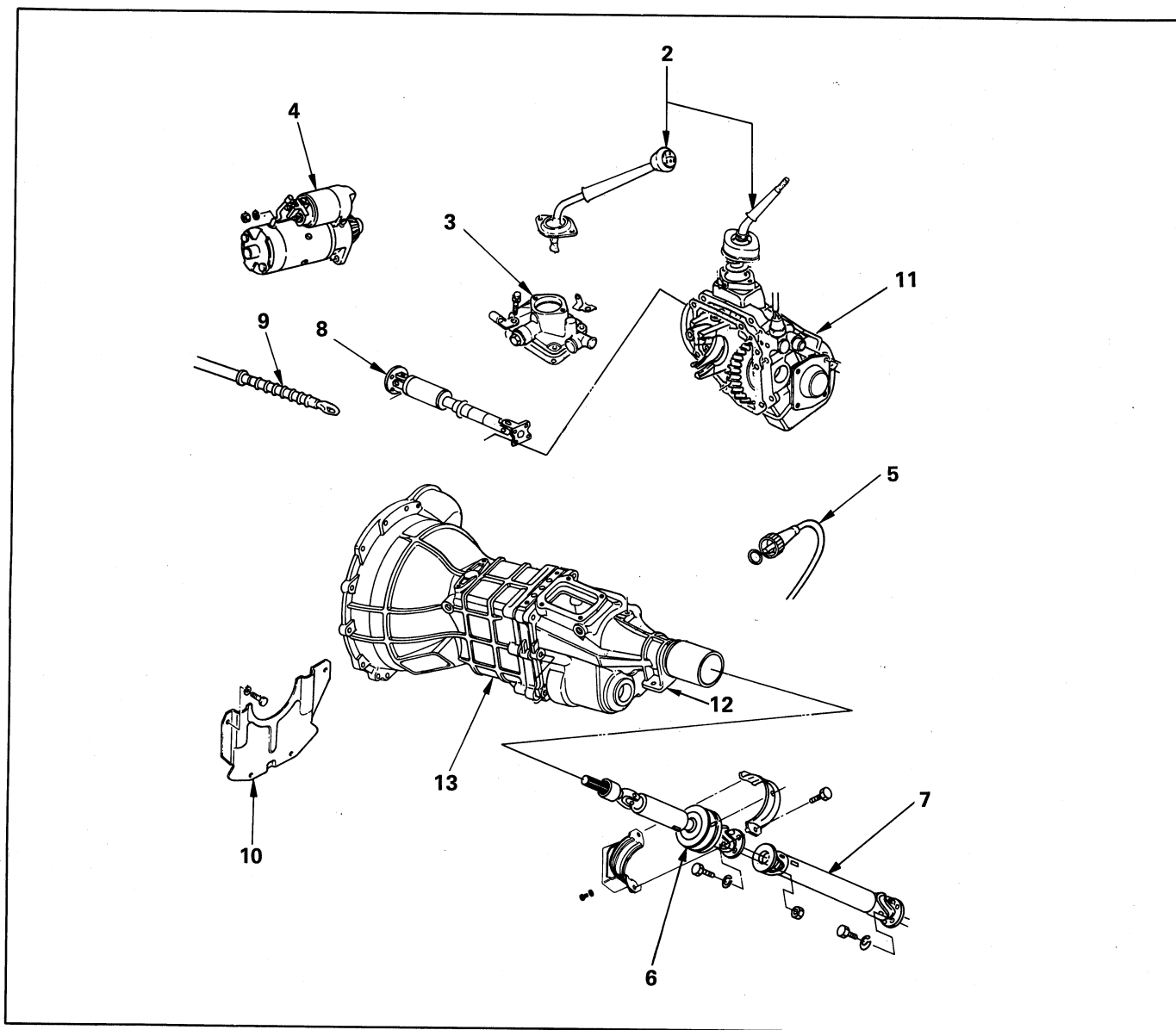
MAJOR PARTS ; FIXING NUTS AND BOLTS

kg-m(ft.lbs.)





REMOVAL AND INSTALLATION

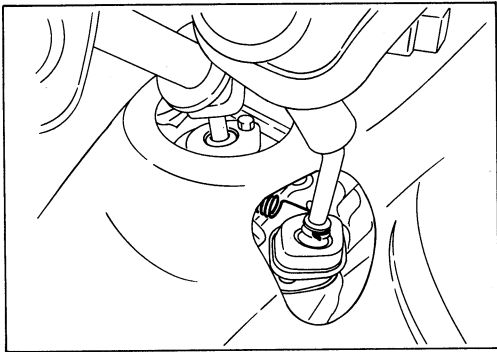


Removal steps

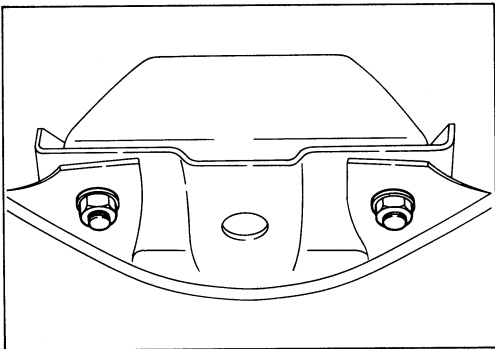
1. Transmission oil drain
- ▲ 2. Gear shift lever assembly
3. Quadrant box
4. Starter motor
5. Speedometer cable
6. Center bearing
7. Propeller shaft (rear side)
8. Propeller shaft (front side)
9. Clutch cable
10. Flywheel stone guard
11. Transmission side case
- ▲ 12. Frame bracket to transmission rear mount bolts and nuts
- ▲ 13. Transmission to engine attaching bolts and transmission assembly

Installation steps

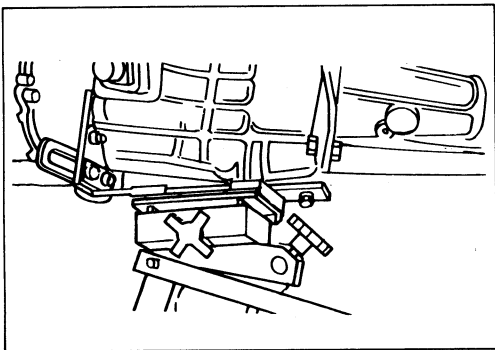
- ▲ 13. Transmission to engine attaching bolts and transmission assembly
12. Frame bracket to transmission rear mount bolts and nuts
- ▲ 11. Transmission side case
10. Flywheel stone guard
9. Clutch cable
8. Propeller shaft (front side)
7. Propeller shaft (rear side)
6. Center bearing
5. Speedometer cable
4. Starter motor
3. Quadrant box
2. Gear shift lever assembly
1. Transmission oil

**Important operations — Removal****2. Gear shift lever assembly**

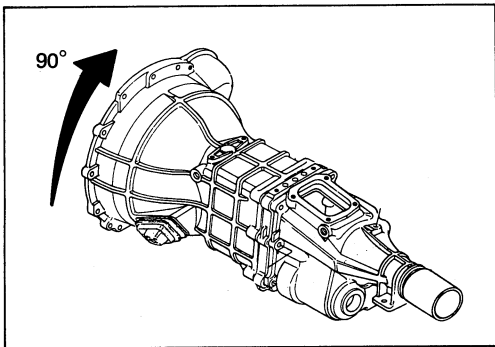
Remove the return spring from the transfer gear shift lever, then remove the levers.

**12. Frame bracket to transmission rear mount bolts and nuts**

Remove the bracket to the transmission rear mount nuts and bolts.

**13. Transmission to engine attaching bolts and transmission assembly**

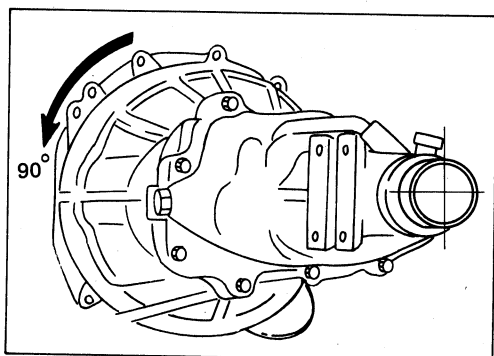
Support the rear end of the oil pan using a jack or equivalent.



When removing the transmission, swing the transmission case 90 degrees clockwise for easier removal.

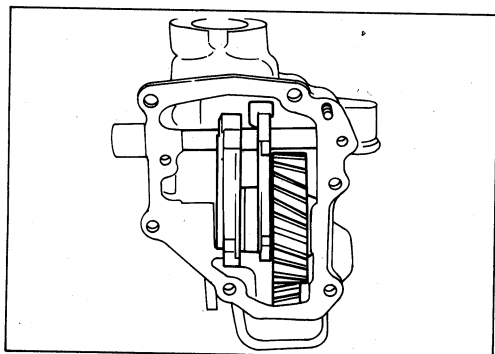


Important operations — Installation



13. Transmission assembly

Position the transmission, with transfer side case fitting face of the transfer case turned down, in the vehicle and slide the gliding top gear shaft forward into the pilot bearing.



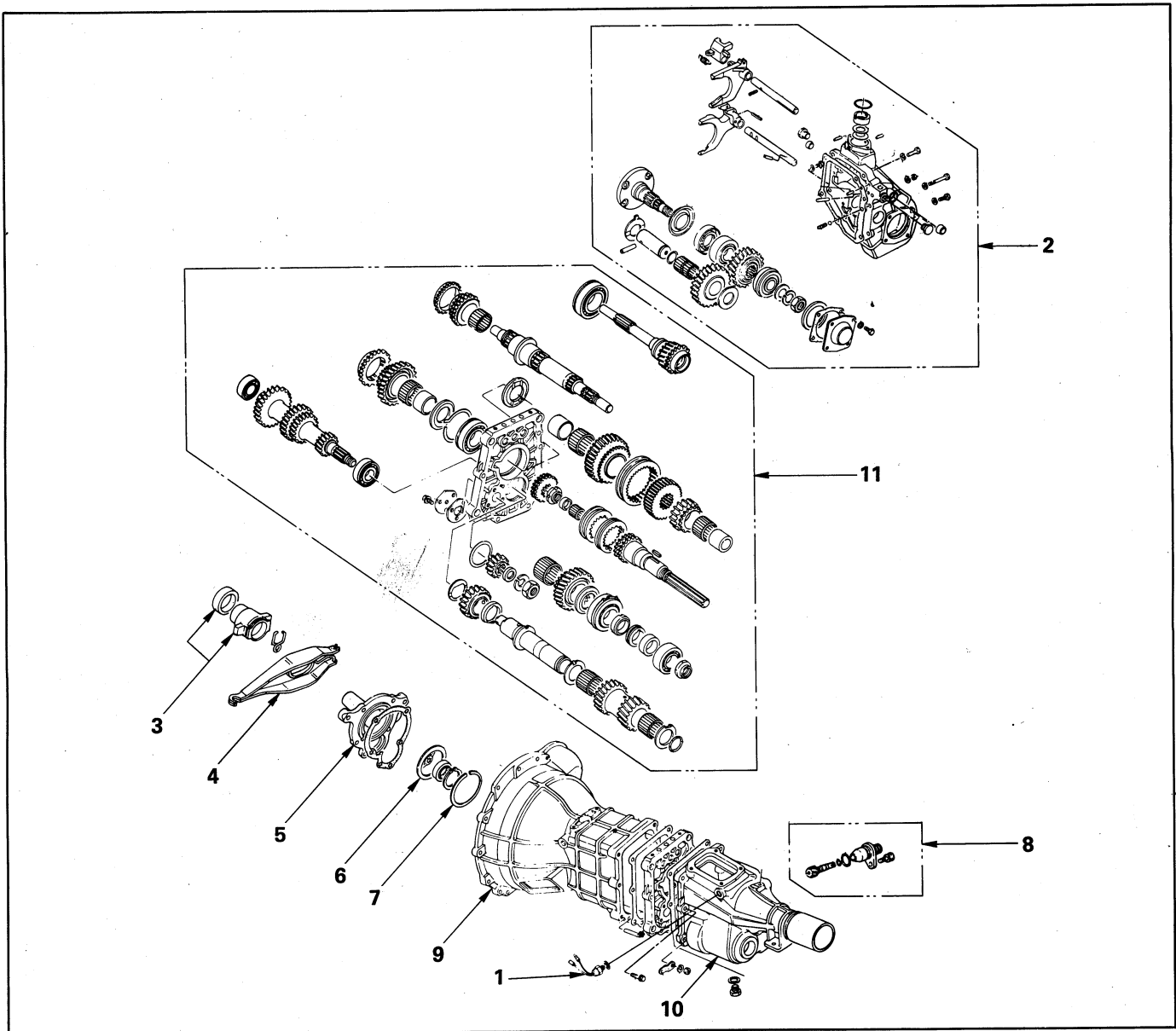
11. Transfer side case

Aligning the grooves in the shift arms shift arms and shift sleeves held in the 2H position.



DISASSEMBLY

MAJOR COMPONENTS

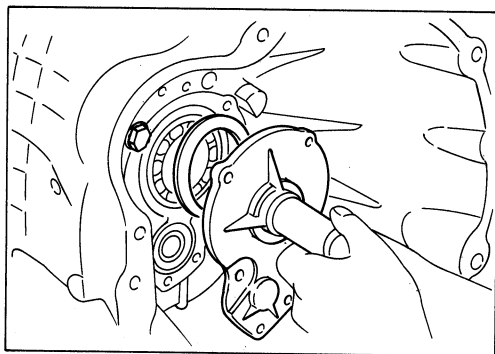


Disassembly steps

- | | |
|--------------------------------|--|
| 1. Back-up light switch | 7. Snap ring |
| 2. Transfer side case assembly | 8. Speedometer driven gear assembly |
| 3. Shift block | ▲ 9. Transmission case |
| 4. Withdraw lever | ▲ 10. Transfer case |
| 5. Front cover | 11. Main shaft assembly, cluster gear shaft assembly and top gear shaft assembly |
| ▲ 6. Belleville spring | |

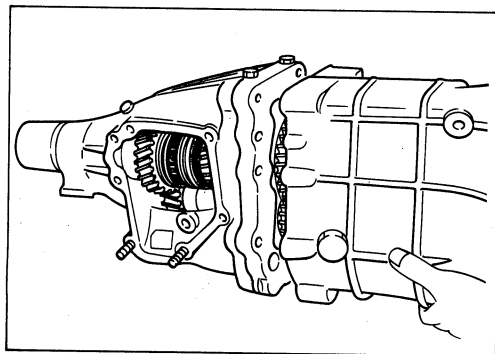


Important operations



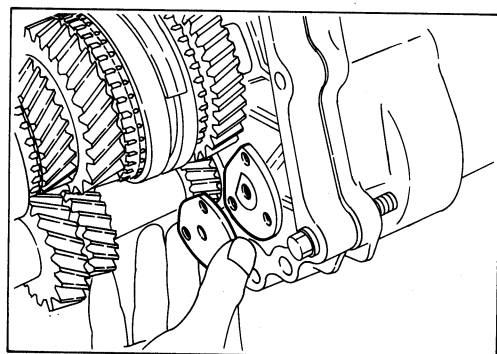
6. Belleville spring

Remove the bearing retainer and the retainer, gasket and Belleville spring.



9. Transmission case

Remove the transfer case, the center support and the transmission case, then remove the transmission case and gasket.

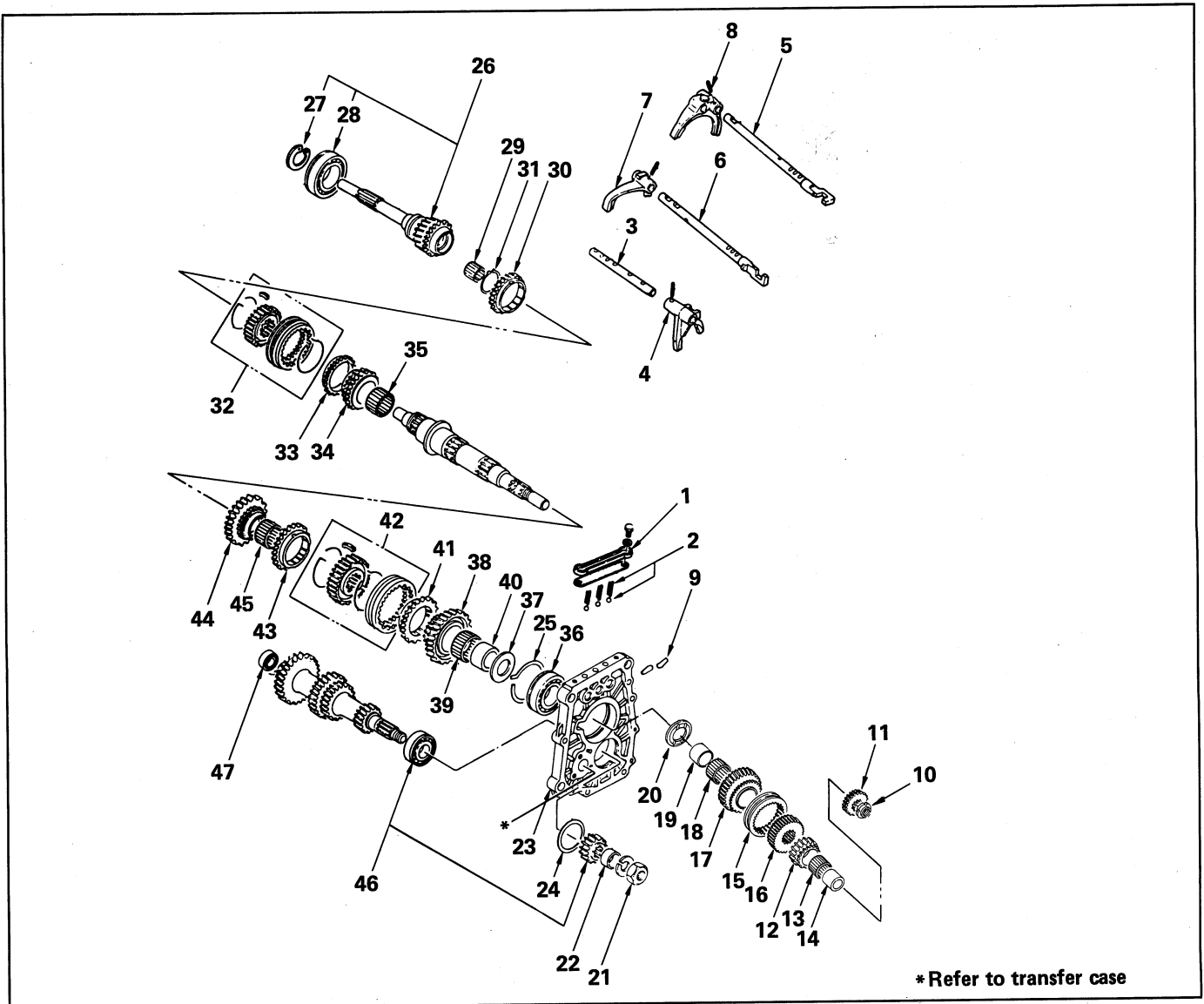


10. Transfer case

Remove the transfer counter shaft lock plate and the distance plate.

MINOR COMPONENT

Main shaft gear assembly, cluster gear assembly and top gear shaft assembly.

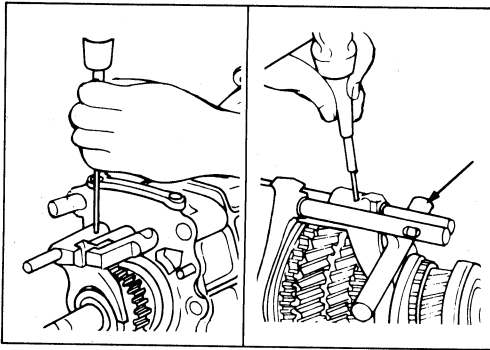


Disassembly steps

- | | | |
|----------------------------------|-----------------------------------|--|
| 1. Detent spring plate | 17. Reverse gear | 33. Top/3rd blocker ring |
| 2. Detent spring and detent ball | 18. Needle roller bearing | 34. 3rd gear |
| ▲ 3. Reverse shift rod | 19. Collar | 35. Needle roller bearing |
| 4. Reverse shift arm | 20. Thrust washer | ▲ 36. Main shaft ball bearing |
| ▲ 5. Low/2nd shift rod | ▲ 21. Nut | 37. Thrust washer |
| ▲ 6. Top/3rd shift rod | 22. Spacer | 38. Low gear |
| 7. Top/3rd shift arm | 23. Intermediate plate | 39. Needle roller bearing |
| 8. Low/2nd shift arm | ▲ 24. Snap ring | 40. Collar |
| 9. Interlock pin | ▲ 25. Snap ring | 41. Low/2nd blocker ring |
| ▲ 10. Nut | 26. Top gear shaft assembly | 42. Low/2nd synchronizer assembly |
| 11. Transfer input hub | 27. Snap ring | 43. Low/2nd blocker ring |
| 12. Transfer input gear | ▲ 28. Top gear shaft ball bearing | 44. 2nd gear |
| 13. Needle roller bearing | 29. Needle roller bearing | 45. Needle roller bearing |
| 14. Collar | 30. Top/3rd blocker ring | ▲ 46. Cluster gear ball bearing and reverse counter gear |
| 15. Sleeve | 31. Snap ring | 47. Cluster gear front ball bearing |
| 16. Reverse hub | 32. Top/3rd synchronizer assembly | |



Important operations

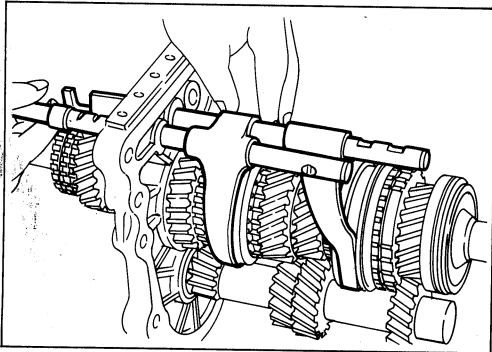


3. Reverse shift rod

5. Low/2nd shift rod

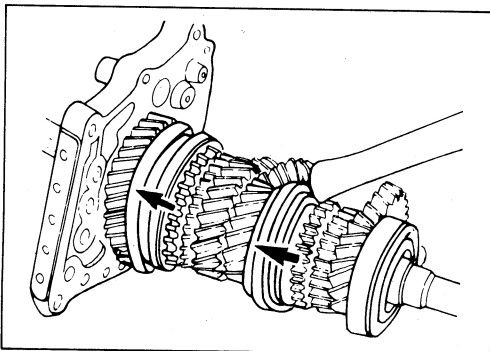
6. Top/3rd shift rod

When removing the spring, hold a round bar against the end of the shift rod to prevent damage.



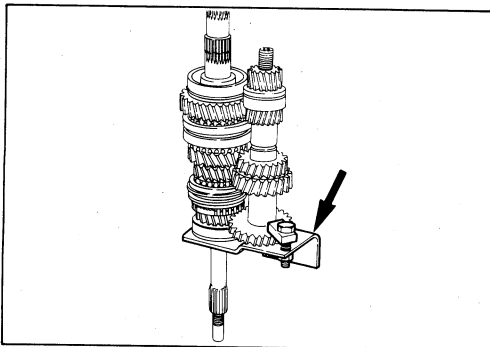
Carefully remove the reverse shifter rod forward to avoid losing the detent interlock pins.

Note: Remove the shifter rods carefully. Detent interlock pins are located between the shifter rods in the center support.



10., 21. Nuts

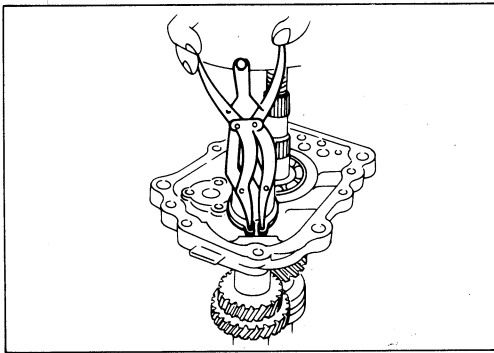
Engage the Top/3rd side synchronizer with the third gear and the Low/2nd side synchronizer with the low gear, then attach Tool J-29768 to the main shaft and the countergear.



Place Tool J-29768 with the mainshaft and countergear assembled in a vise.

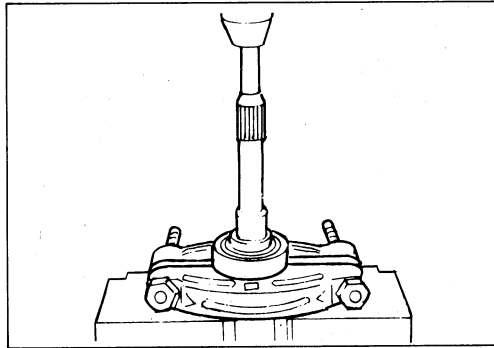
From the mainshaft, remove the lock nuts. Using the J-29041 tool.

This operation is necessary to prevent turning of the shaft when removing main shaft rear and counter shaft reverse gear lock nut.



24., 25. Snap ring

Remove the center support by expanding the mainshaft rear bearing snap ring with the snap ring pliers.

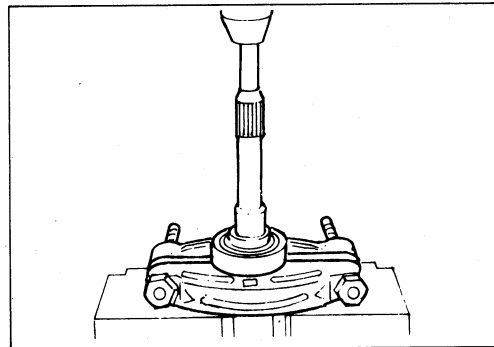


28. Top gear shaft ball bearing

Use a bench press.

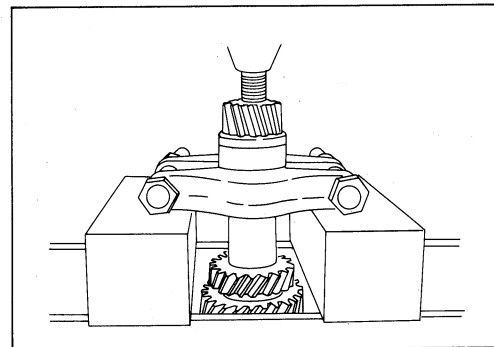


J-22912-01



36. Main shaft ball bearing

Use a bench press.



46. Cluster gear ball bearing and reverse counter gear

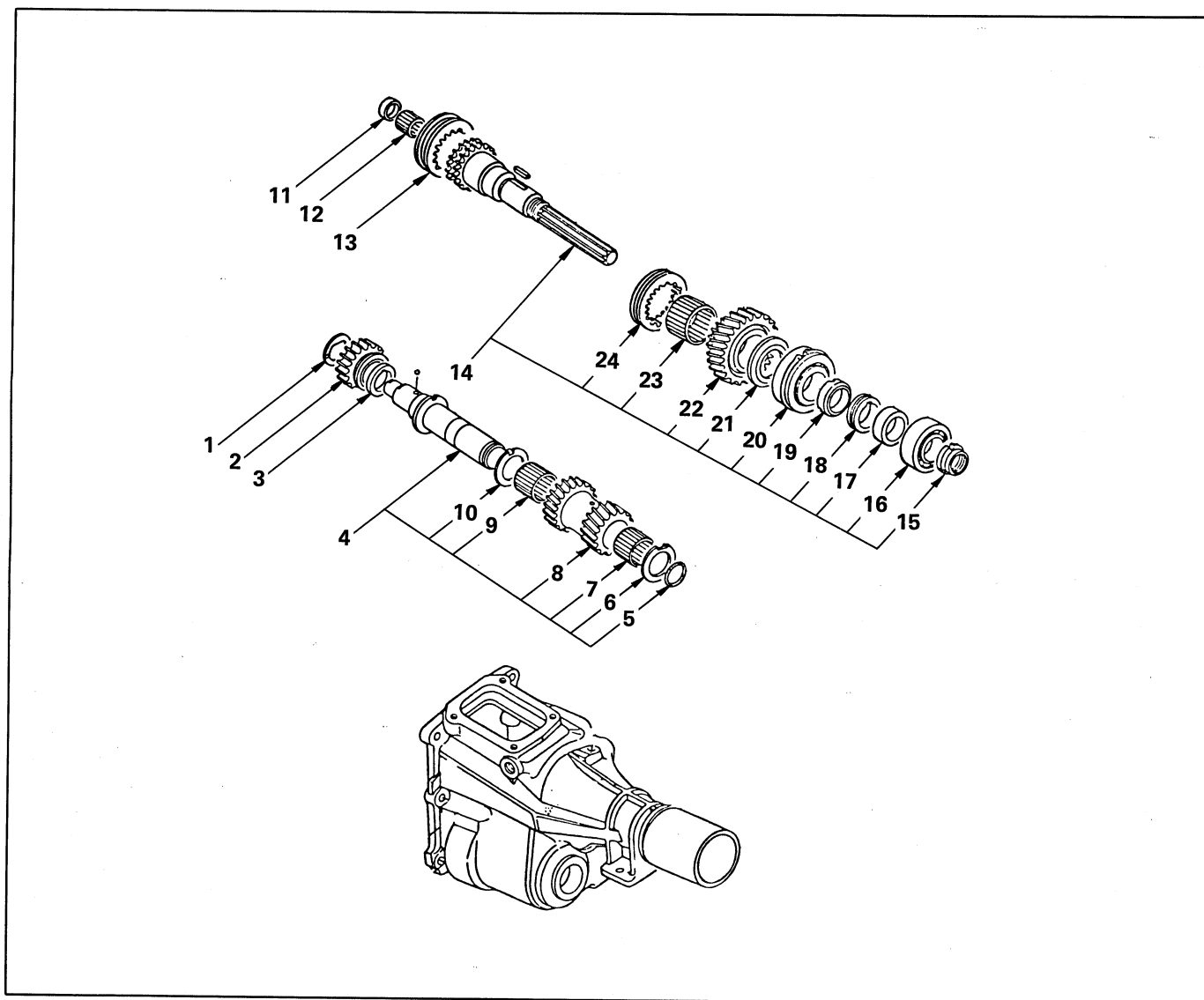
Use a bench press.



J-22912-01

MINOR COMPONENTS

Transfer case

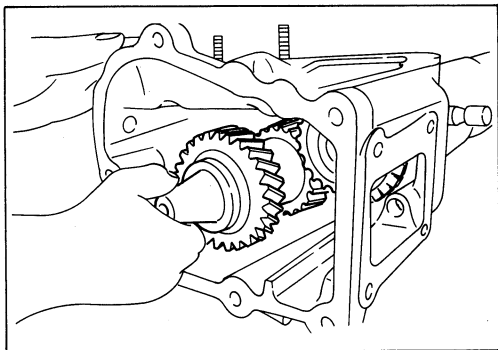


Disassembly steps

- | | |
|--------------------------------------|-----------------------------|
| 1. Thrust washer | 13. High/Low sleeve |
| 2. Reverse idler gear | ▲ 14. Output shaft assembly |
| 3. Spacer | ▲ 15. Nut |
| ▲ 4. Transfer counter shaft assembly | ▲ 16. Ball bearing |
| ▲ 5. O-ring | 17. Spacer |
| 6. Thrust washer | 18. Speedometer drive gear |
| 7. Counter gear | 19. Distance piece |
| 8. Needle roller bearing | ▲ 20. Ball bearing |
| 9. Needle roller bearing | 21. Thrust washer |
| 10. Thrust washer | 22. Output gear |
| 11. Spacer | 23. Needle roller bearing |
| 12. Needle roller bearing | 24. 4x2/4x4 sleeve |

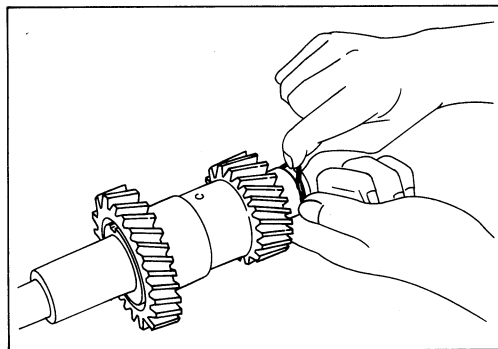


Important operations



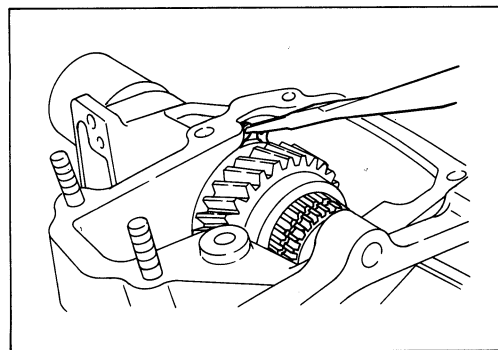
4. Transfer counter shaft assembly

Lightly tap the transfer countershaft assembly out through the shaft fitting hole in the case.



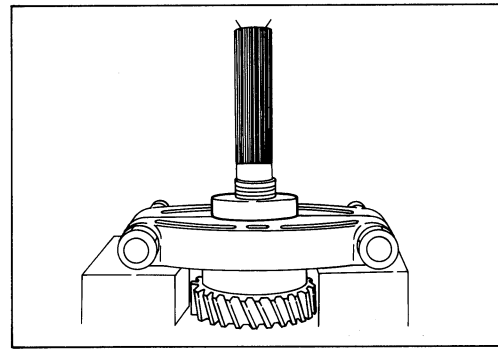
5. O-ring

From the transfer countershaft, remove the O-ring, thrust washer, countergear, needle roller bearings, and thrust washer.



14. Output shaft assembly

Expand the rear output shaft front bearing snap ring and remove the output shaft assembly forward.



15. Nut

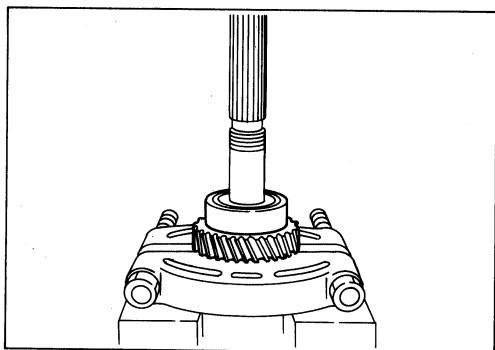
Nut hex : 41 mm (1-5/8 in.)

16. Ball bearing

Use a bench press.



J-22912-01



20. Ball bearing

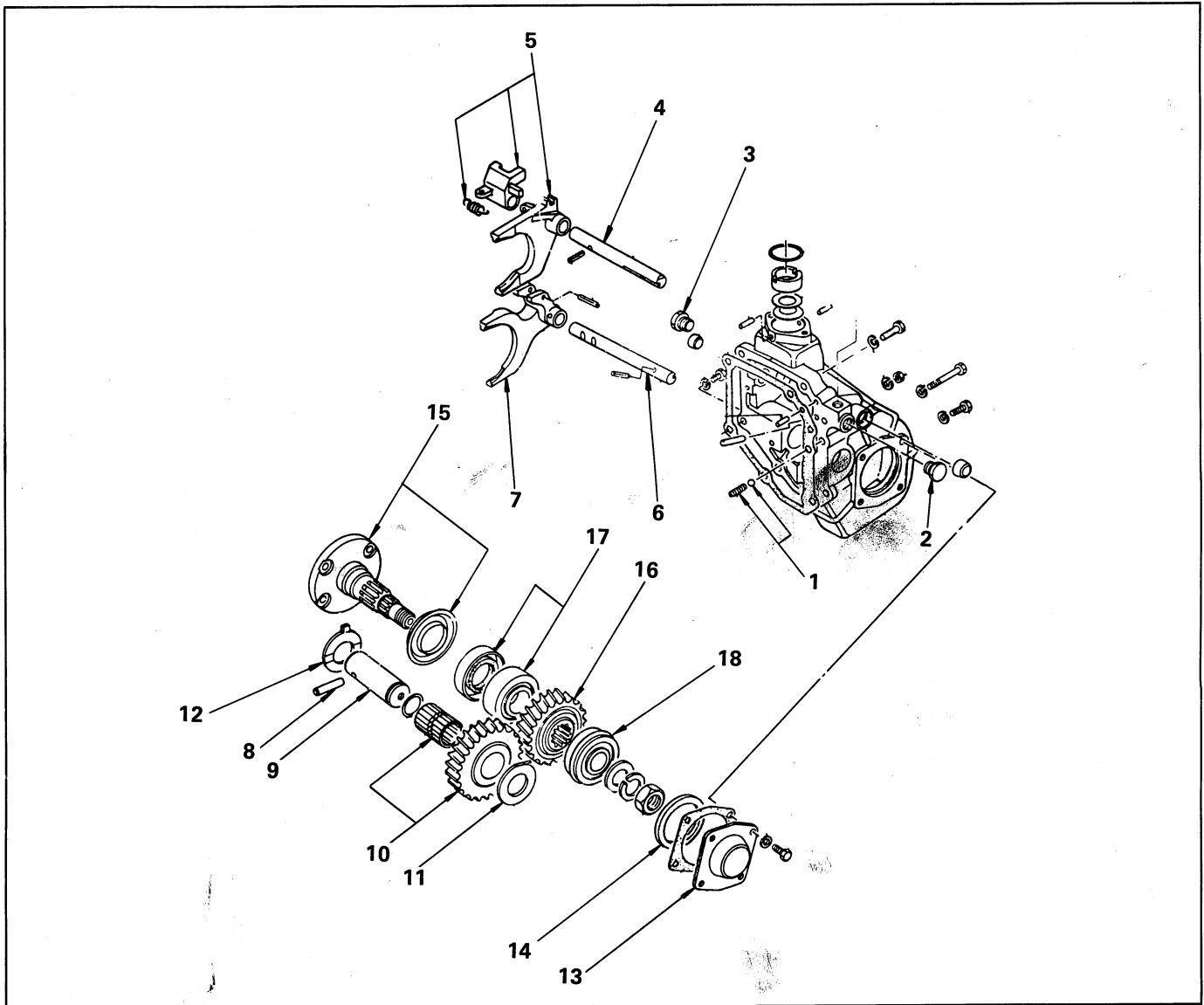
Use a bench press.



J-22912-01

MINOR COMPONENTS

Transfer side case



Disassembly steps

- | | |
|--------------------------------------|--|
| 1. Detent spring and detent ball | 10. Idler gear and needle roller bearing |
| 2. Screw plug | 11. Thrust washer |
| 3. Screw plug | 12. Thrust washer |
| ▲ 4. Shift rod | ▲ 13. Front output shaft cover |
| 5. 4x2/4x4 shift arm and shift block | 14. Distance piece |
| ▲ 6. Shift rod | ▲ 15. Front output shaft |
| 7. High/Low shift arm | 16. Front output gear |
| 8. Dowel pin | ▲ 17. Front output shaft front bearing |
| ▲ 9. Idler gear shaft | ▲ 18. Front output shaft rear bearing |

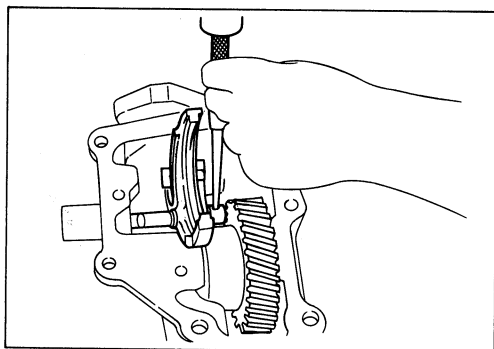


Important operations

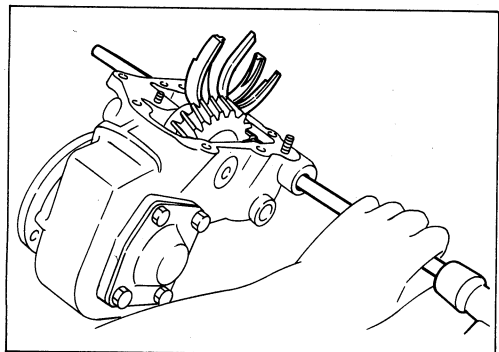


4., 6. Shift rods

Remove the spring pin from the shift arm.

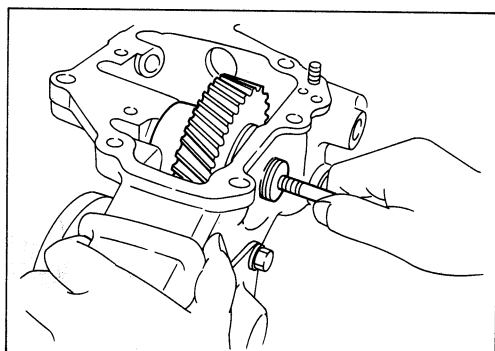


Drive the shift rod toward the output side.



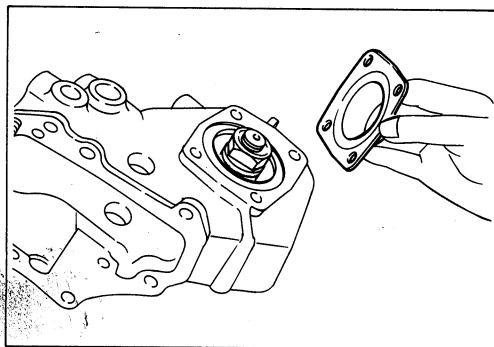
9. Idler gear shaft

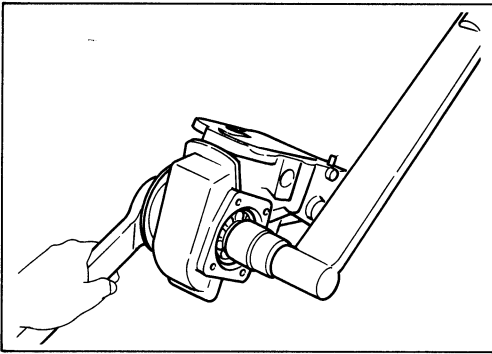
Force out the shaft by turning in the 8 mm (P. 1.25 mm) bolt in the threaded hole at end of the idler shaft, then remove the thrust washers, idler gear and needle roller bearing.



13. Front output shaft cover

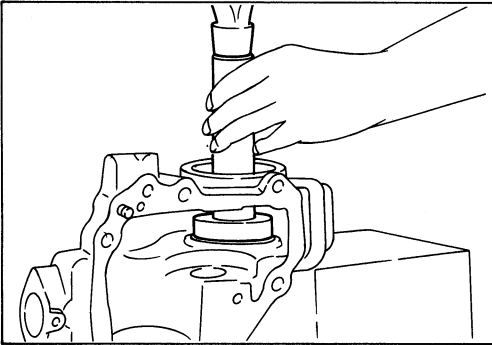
Remove the front output shaft cover, then remove the distance piece.





15. Front output shaft

Set J-8614-01 or equivalent, to the flanged portion of the front output shaft and loosen and remove the shaft nut spring washer and plain washer.



17. Front output shaft front bearing

18. Front output shaft rear bearing

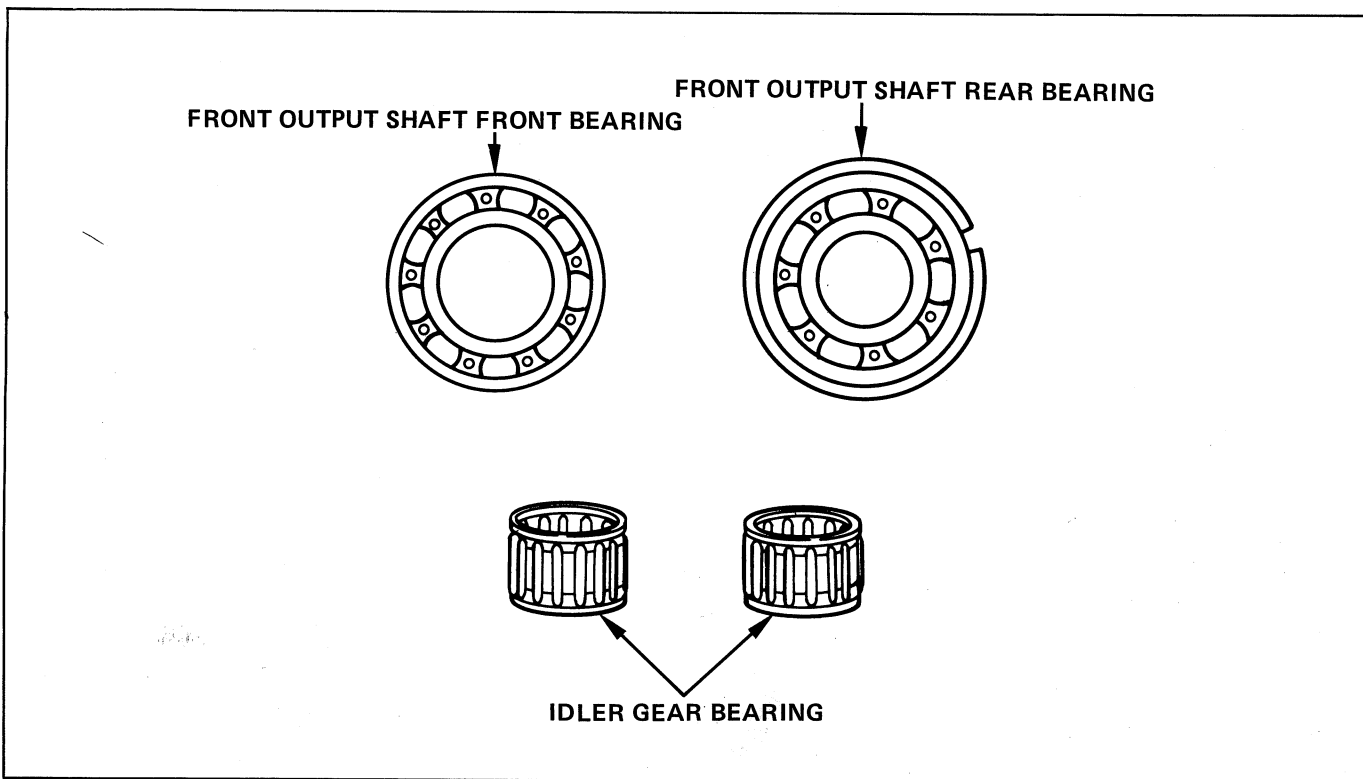
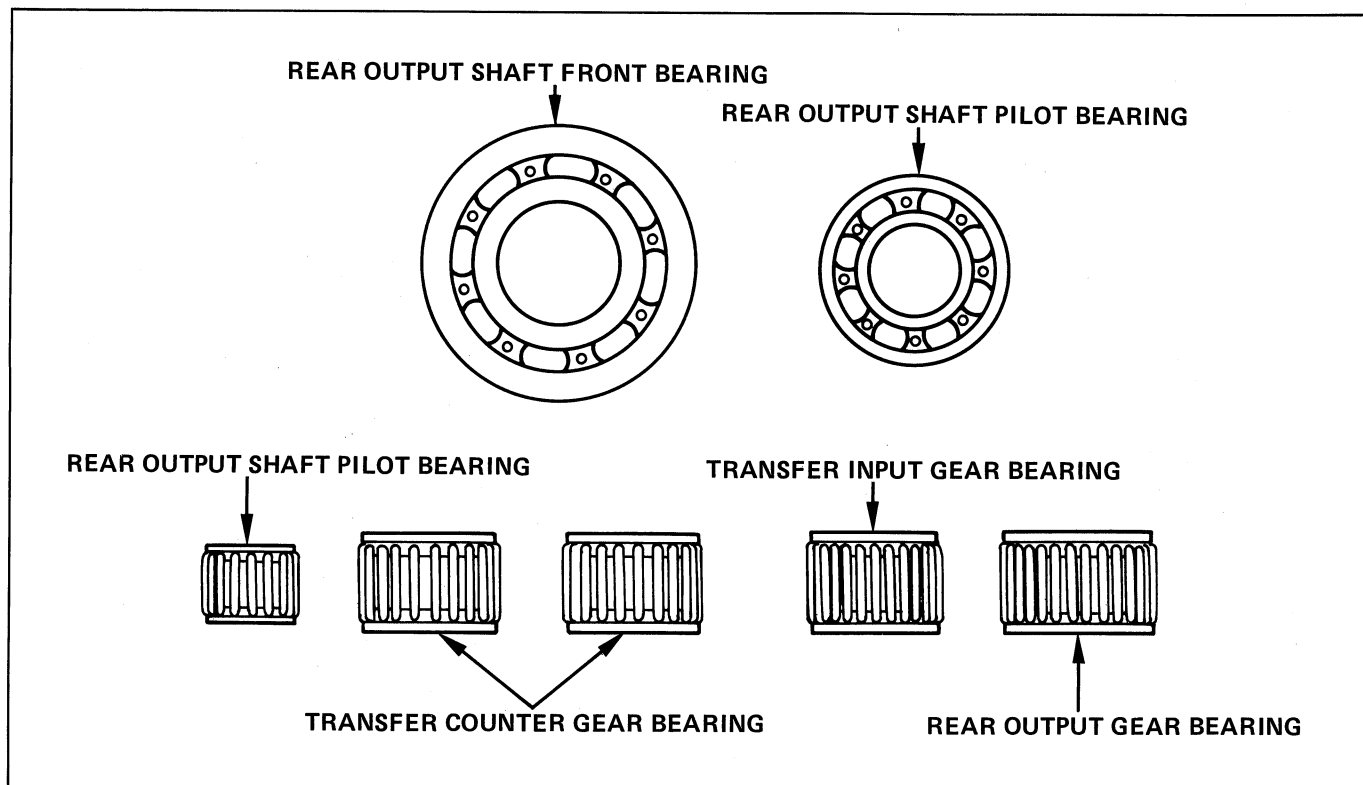
Remover and installer : J-29040

Grip : J-8092

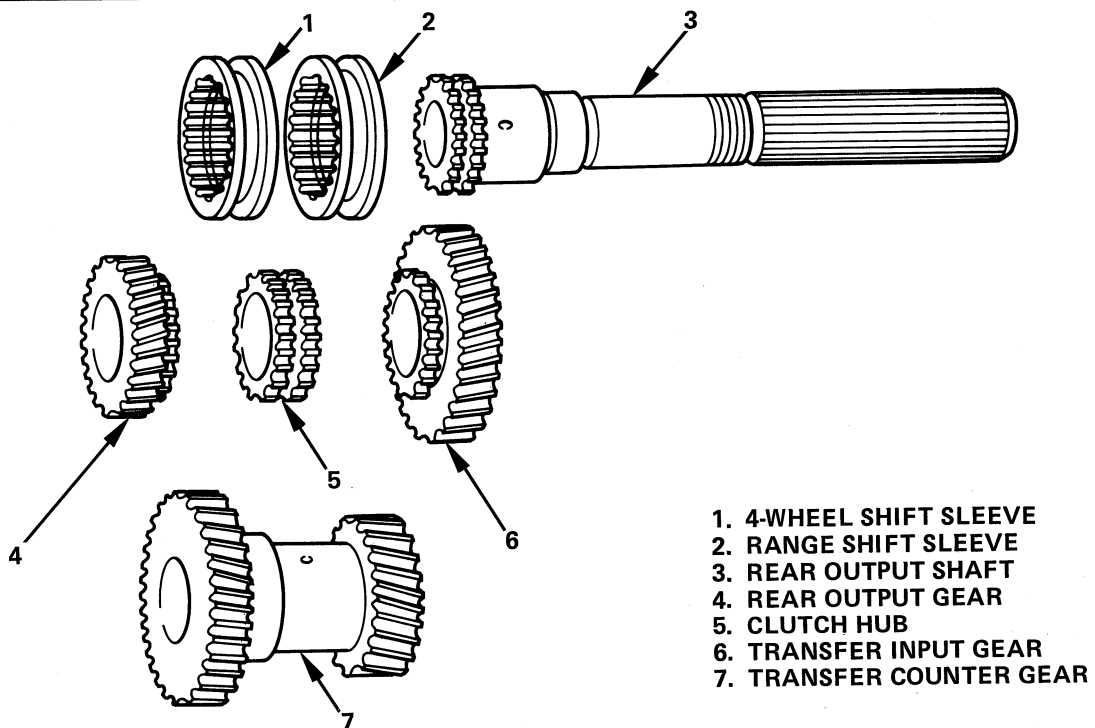
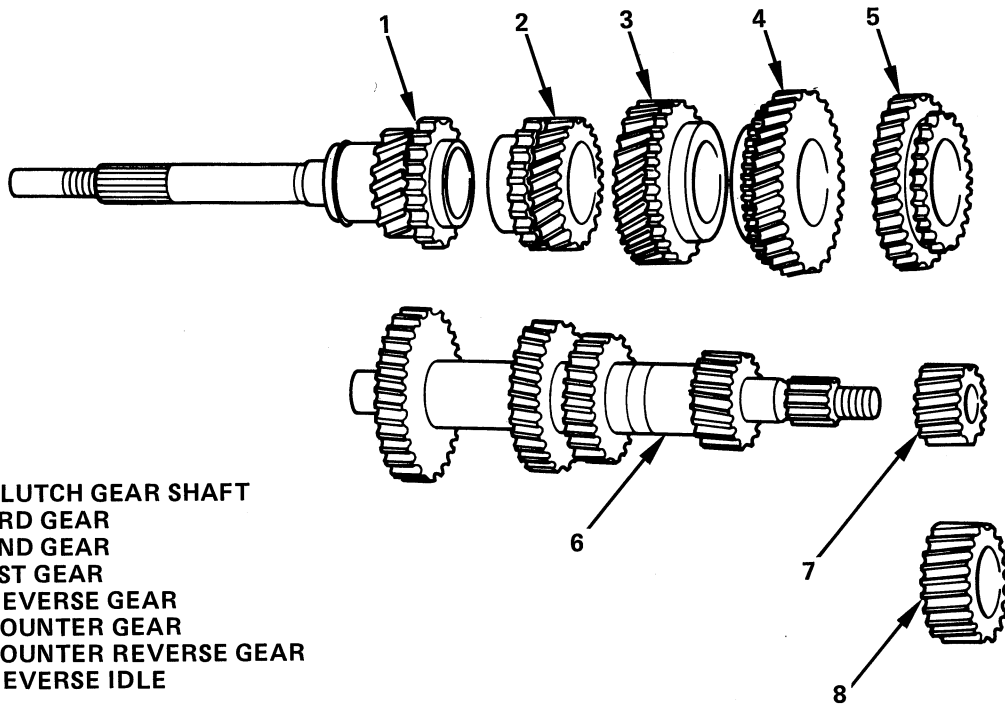


INSPECTION AND REPAIR

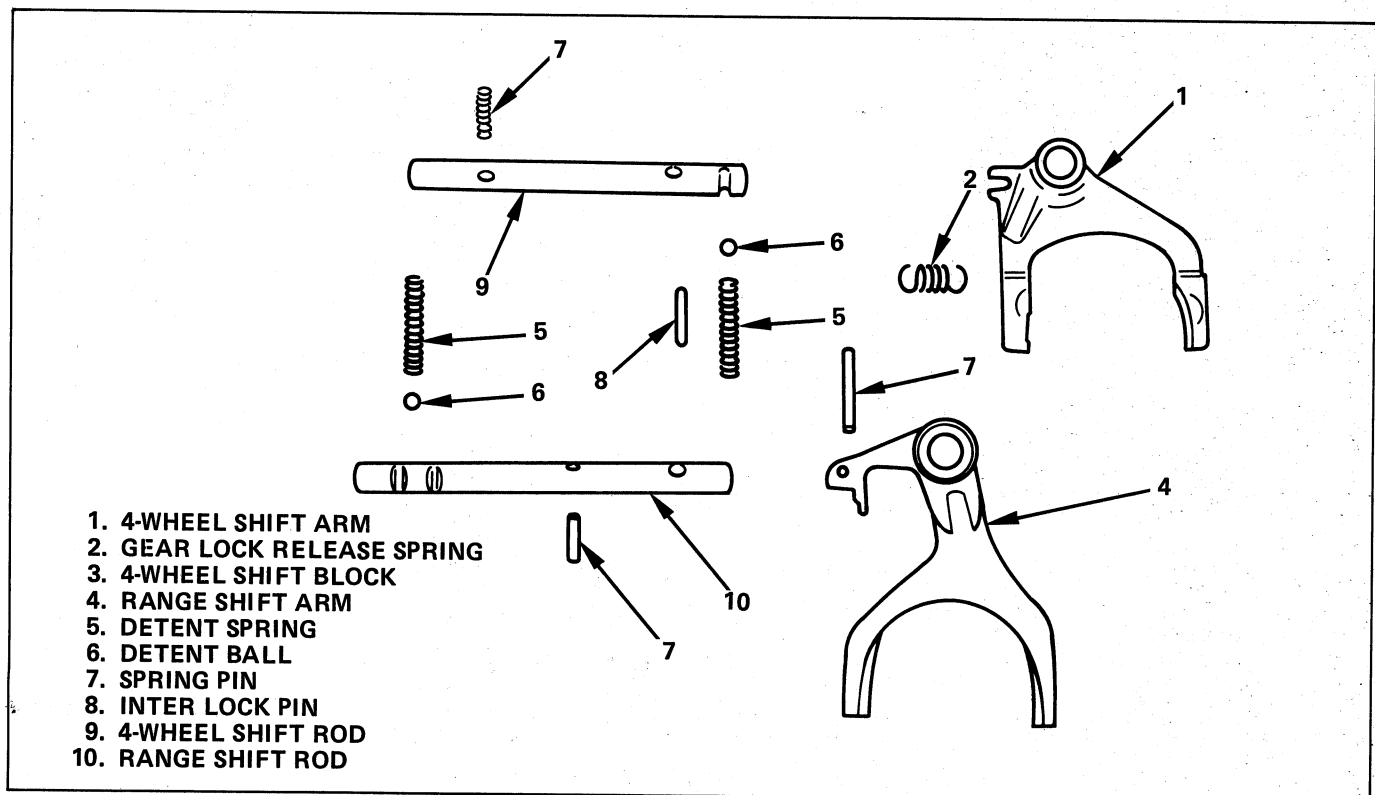
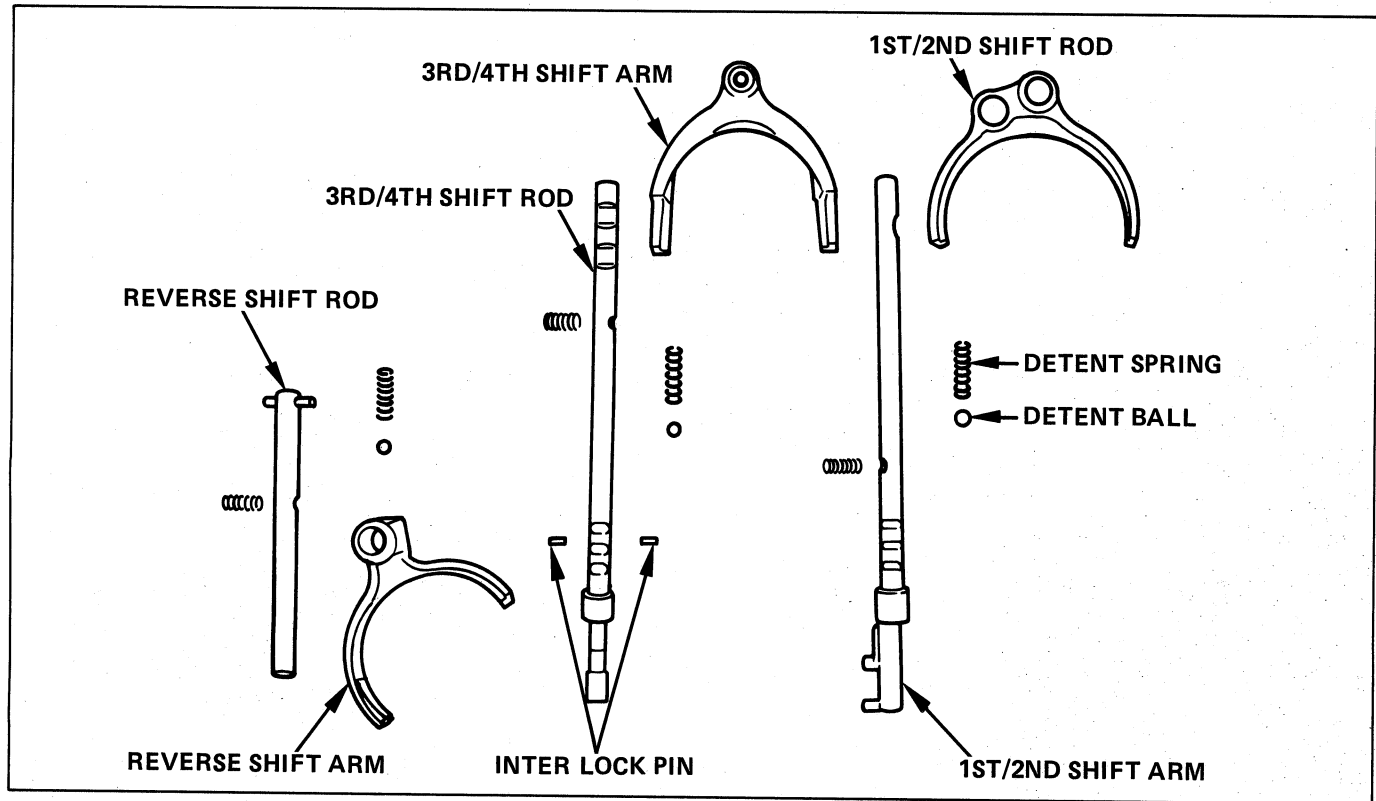
Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

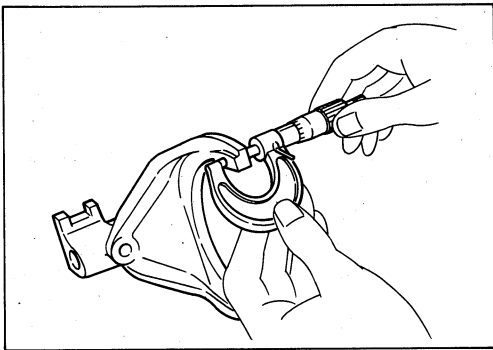


Gears

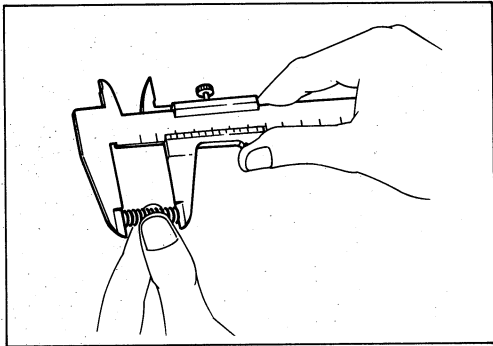


Shift Mechanism

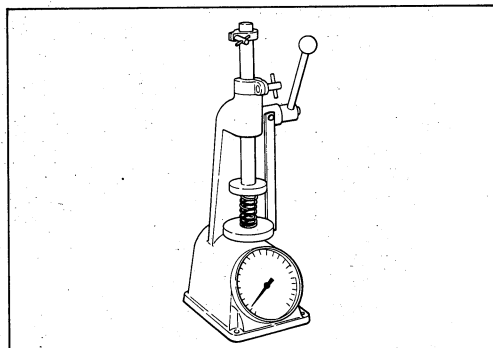


**Shift arm thickness**

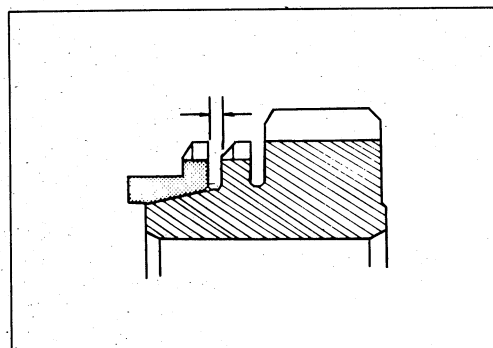
	mm(in.)	
	Standard	Limit
Low/2nd, Reverse	7.8 — 7.9 (0.307 — 0.311)	7.0 (0.276)
Top/3rd	7.1 — 7.2 (0.280 — 0.284)	6.5 (0.256)
Transfer 4x2/4x4 High/Low	6.7 — 6.8 (0.264 — 0.268)	6.0 (0.236)

**Free length of detent spring**

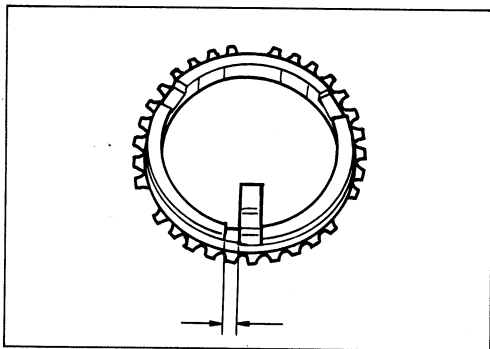
	mm(in.)	
	Standard	Limit
Low/2nd, Top/3rd	30.5 (1.202)	28.5 (1.103)
Reverse	27.7 (1.091)	25.0 (0.985)
Transfer	43.0 (1.694)	41.0 (1.615)

**Spring tension**

	kg(lbs.)	
	Set length mm(in.)	Standard
Low/2nd, Top/3rd	22.1 (0.871)	4.0 — 4.2 (8.82 — 9.04)
Reverse	22.1 (0.871)	6.3 — 6.7 (13.89 — 14.77)
Transfer	36.1 (1.422)	9 — 11 (19.84 — 24.25)

**Clearance between blocker ring and dog gear**

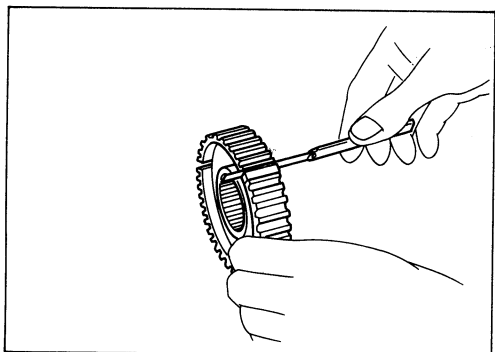
	mm(in.)	
	Standard	Limit
Low/2nd, Top/3rd	1.7 (0.067)	0.8 (0.032)



Clearance between blocker ring and insert

mm(in.)

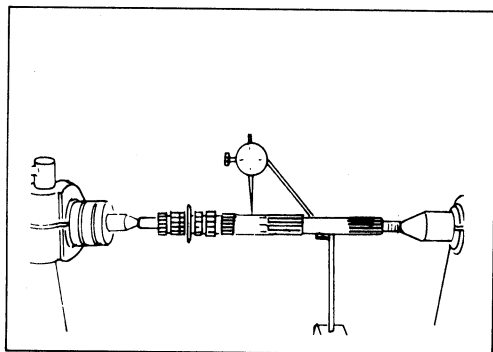
Standard	Limit
3.51 — 3.79 (0.138 — 0.149)	4.0 (0.158)



Clearance between clutch hub and insert

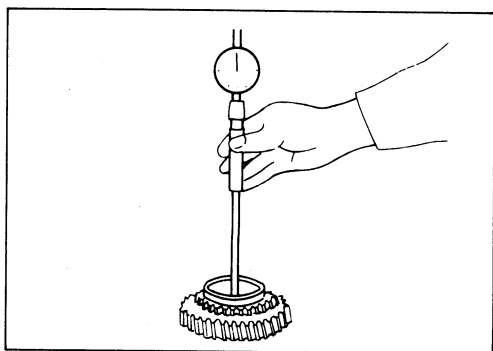
mm(in.)

Standard	Limit
0.01 — 0.19 (0.0004 — 0.0075)	0.3 (0.012)



Main shaft run-out

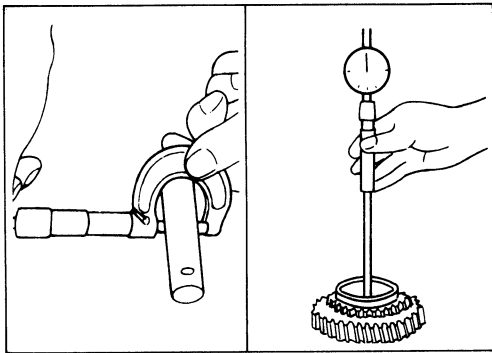
Limit	mm(in.)	0.05 (0.0019)
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Gear inside diameter

mm(in.)

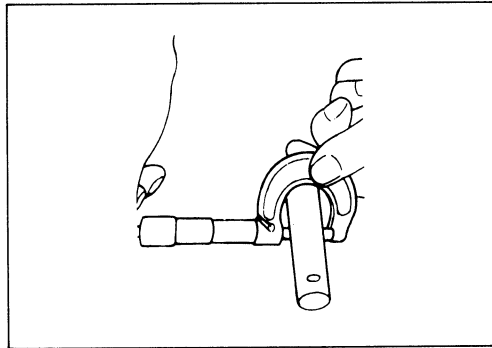
	Standard	Limit
Low	45.0 — 45.013 (1.773 — 1.774)	45.1 (1.777)
2nd, 3rd	41.0 — 41.013 (1.615 — 1.616)	41.1 (1.619)
Transfer Idler	33.0 — 33.025 (1.300 — 1.301)	33.1 (1.304)



Clearance between bushing and idler gear

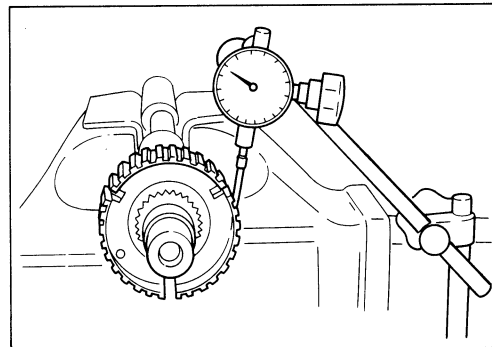
mm(in.)

	Standard	Limit
Reverse	0.041 — 0.074 (0.0016 — 0.0029)	0.15 (0.0059)



Transfer idler gear shaft outside diameter

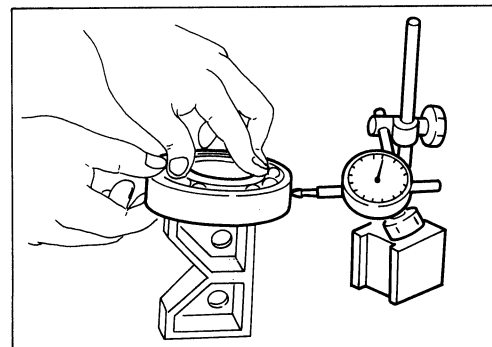
Standard	mm(in.)	24.99 — 25.0 (0.984 — 0.985)
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Play in splines

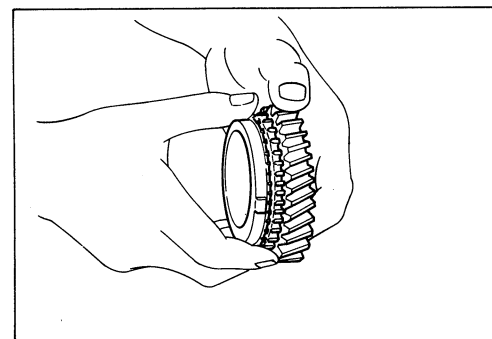
mm(in.)

	Standard	Limit
Clutch hub	0 — 0.19 (0 — 0.0074)	0.2 (0.0078)
Reverse gear	0.062 — 0.132 (0.0024 — 0.0052)	0.2 (0.0078)



Play in ball bearing

Limit	mm(in.)	0.2 (0.0678)
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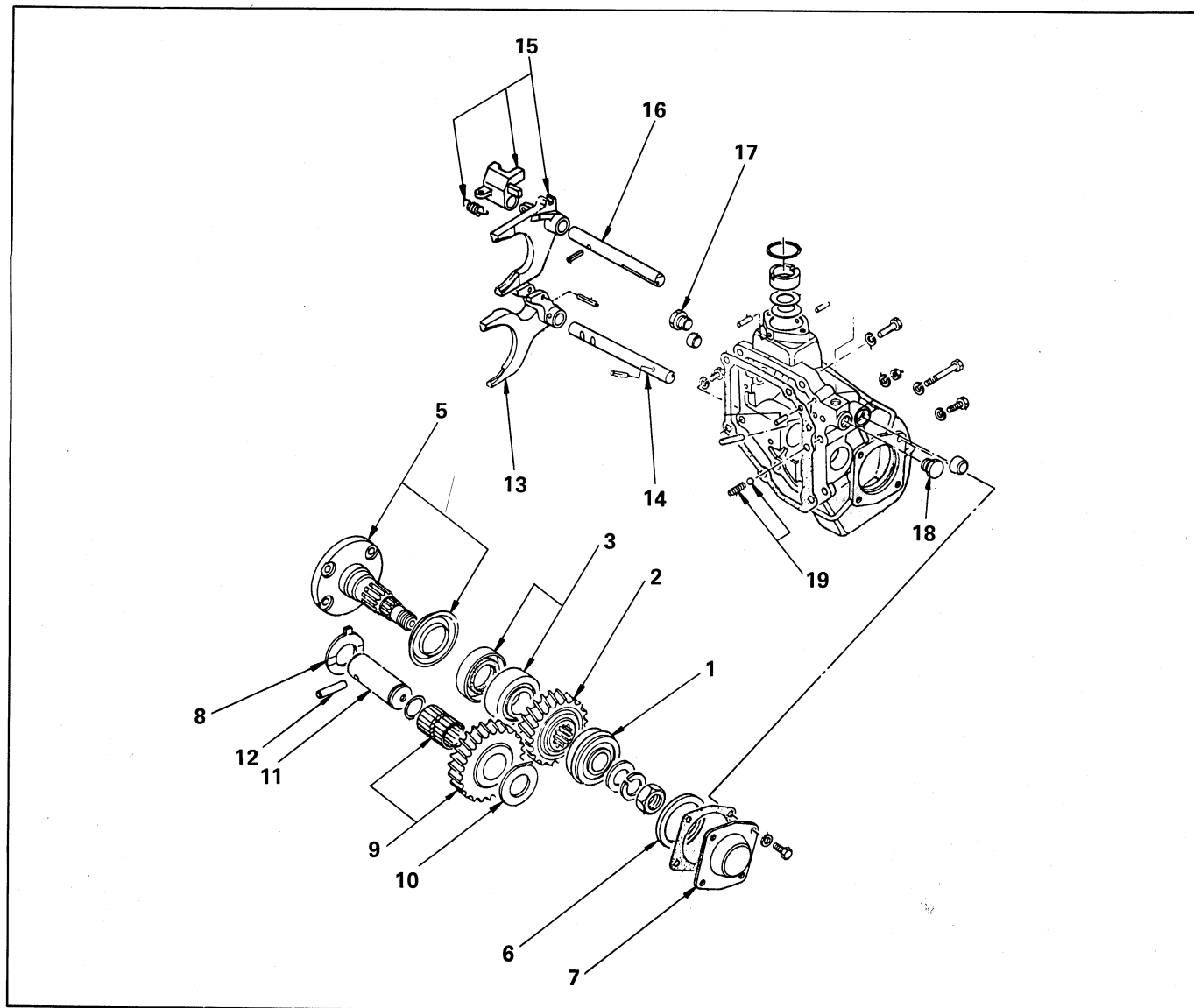
Limit	mm(in.)	0.8 (0.032)
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REASSEMBLY

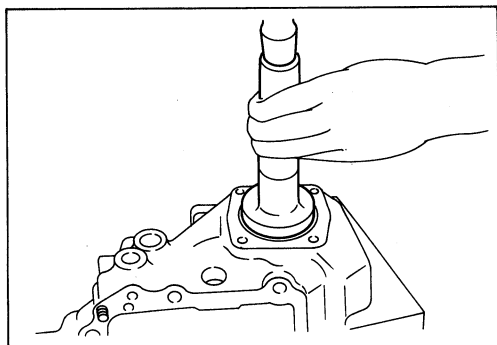
MINOR COMPONENTS

Transfer side case



Reassembly steps

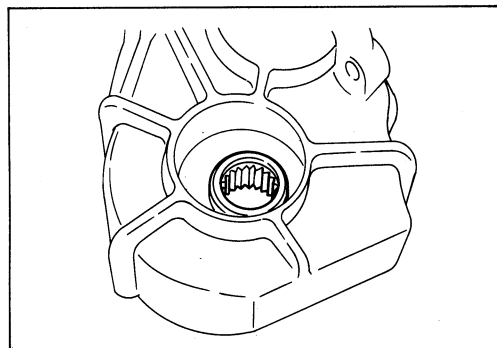
- | | |
|--|---|
| ▲ 1. Front output shaft rear bearing | ▲ 11. Idler gear shaft |
| ▲ 2. Output gear | ▲ 12. Dowel pin |
| ▲ 3. Front output shaft front bearing and oil seal | ▲ 13. High/Low shift arm |
| ▲ 4. Output shaft oil seal | ▲ 14. High/Low shift rod |
| ▲ 5. Front output shaft | ▲ 15. 4x2/4x4 shift arm and shift block |
| ▲ 6. Distance piece | ▲ 16. 4x2/4x4 shift rod |
| ▲ 7. Front output shaft cover | ▲ 17. Screw plug and plug |
| ▲ 8. Thrust washer | ▲ 18. Screw plug and plug |
| ▲ 9. Idler gear and needle roller bearing | ▲ 19. Detent spring and detent ball |
| ▲ 10. Thrust washer | |

**Important operations****1. Front output shaft rear bearing**

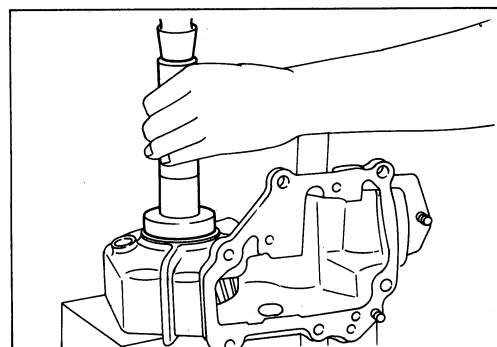
Install the front output shaft rear bearing into position deep enough to touch snap ring.



Bearing remover and installer : J-29040
Grip : J-8092

**2. Output gear**

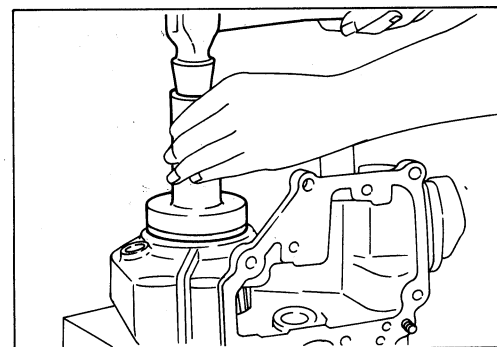
Install the output gear, so that its end without splines (on inner circumference) is turned toward front side (toward output shaft flange).

**3. Front output shaft front bearing**

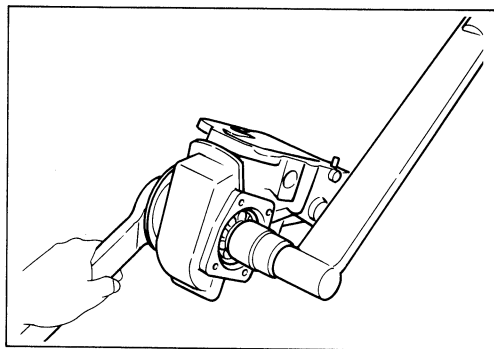
Drive the output shaft front bearing into position to touch output gear.



Bearing remover and installer : J-29040
Grip : J-8092

**4. Output shaft oil seal**

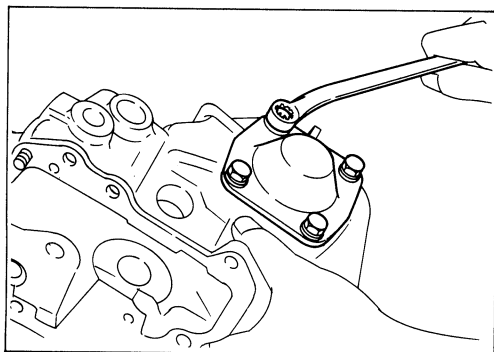
Installer : J-29037
Grip : J-8092

**5. Front output shaft**

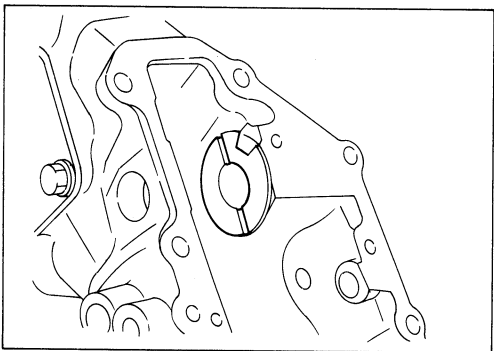
Wrench : J-8614-01



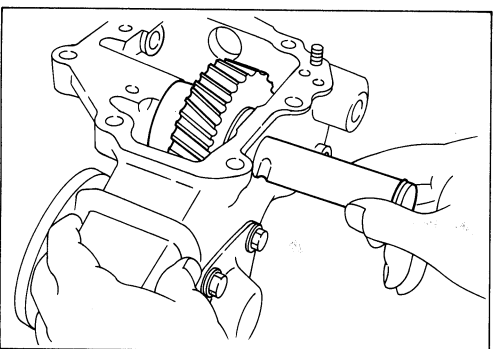
Torque	kg-m(ft.lbs.)	14 — 16 (101 — 116)
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**7. Front output shaft cover**

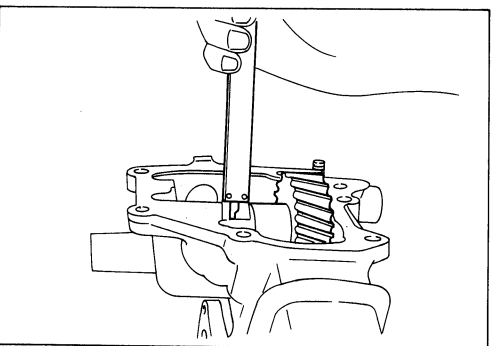
Torque	kg-m(ft.lbs.)	2.5 — 3.1 (18 — 22)
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**8., 10. Thrust washer**

Apply grease to both faces of the idler gear thrust washer, then install the thrust washer, with the oil grooved face turned toward the gear, by aligning the stopper finger with the groove in the case.

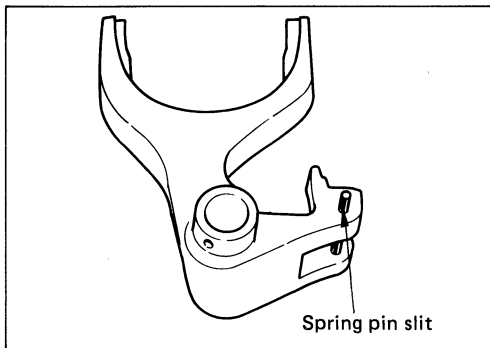
**11. Idler gear shaft**

Coat the idler shaft O-ring with clean engine oil and install the idler gear shaft by aligning the dowel groove in the idler shaft with the dowel pin hole.

**12. Dowel pin**

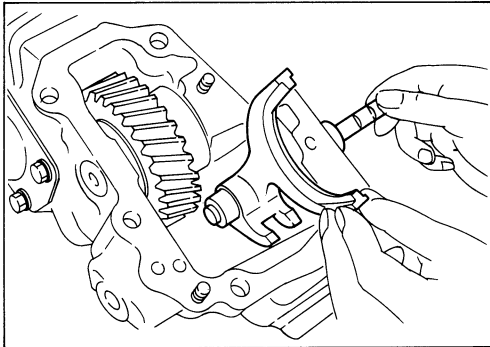
Insert the dowel pin into the case and check that its projection is within the specified value.

Projection	mm(in.)	9 — 11 (0.355 — 0.433)
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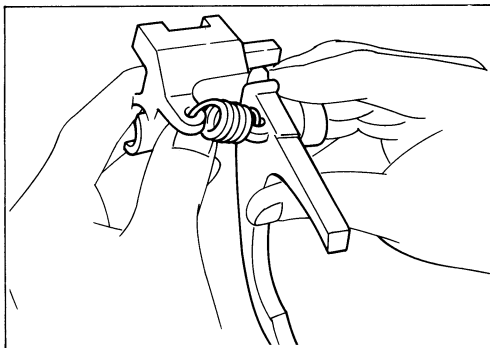


14. High/Low shift rod

Attach the range shift arm so that the slit in the spring pin is turned.

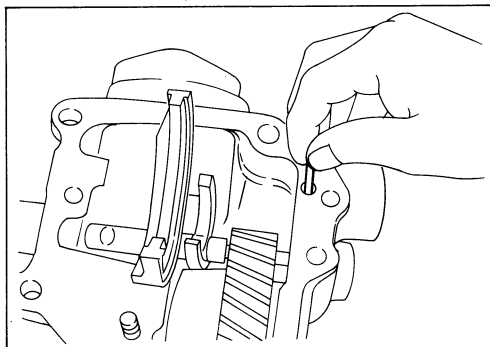


Attach and secure the shift arm the shift rod in position with the spring pin.



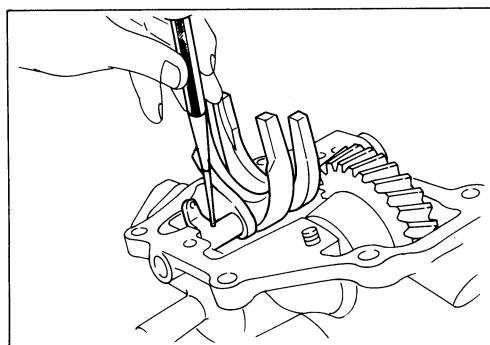
15. 4x2/4x4 shift arm and shift block

Assemble the shift arm with the shift block, then attach the gear lock release spring.



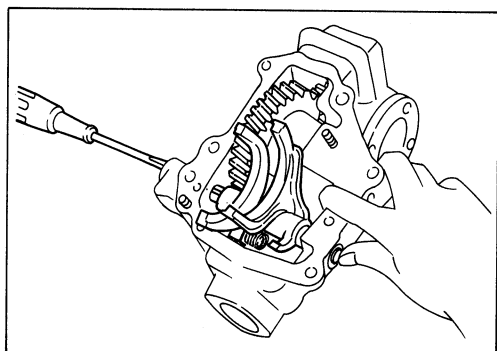
16. 4x2/4x4 shift rod

Insert the interlock pin, the shift rod detent ball and the detent spring in the case.



Insert and secure the shift arm, the shift block and the shift rod in position with the spring pin.

05—28 TRANSMISSION WITH TRANSFER CASE

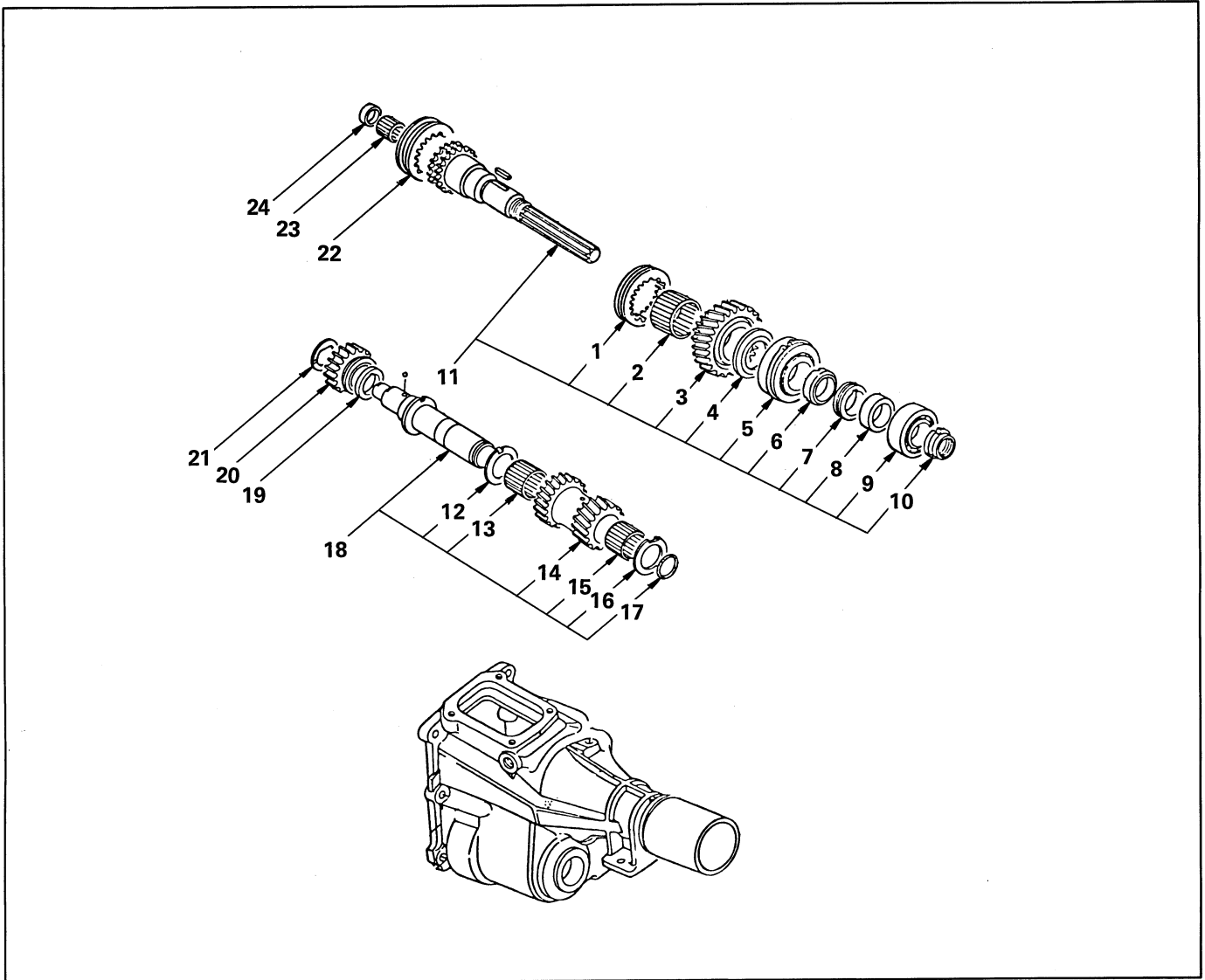


17., 18. Screw plug and plug

Screw plug torque	kg-m(ft.lbs.)	4.5 — 5.5 (33 — 40)
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MINOR COMPONENTS

Transfer case

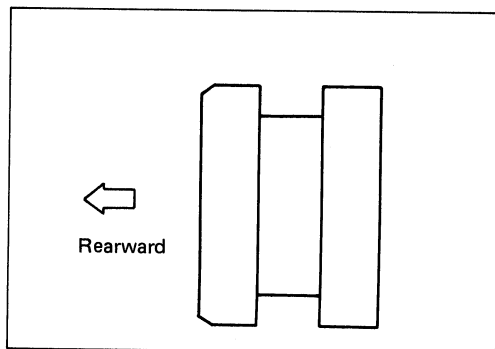


Reassembly steps

- | | |
|-----------------------------|------------------------------|
| ▲ 1. 4x2/4x4 sleeve | 13. Needle roller bearing |
| 2. Needle roller bearing | 14. Counter gear |
| 3. Output gear | 15. Needle roller bearing |
| ▲ 4. Thrust washer | 16. Thrust washer |
| ▲ 5. Ball bearing | 17. O-ring |
| 6. Distance piece | ▲ 18. Counter shaft assembly |
| 7. Speedometer drive gear | ▲ 19. Spacer |
| 8. Spacer | 20. Reverse idler gear |
| ▲ 9. Ball bearing | ▲ 21. Thrust washer |
| ▲ 10. Nut | ▲ 22. High/Low sleeve |
| ▲ 11. Output shaft assembly | 23. Needle roller bearing |
| 12. Thrust washer | 24. Spacer |

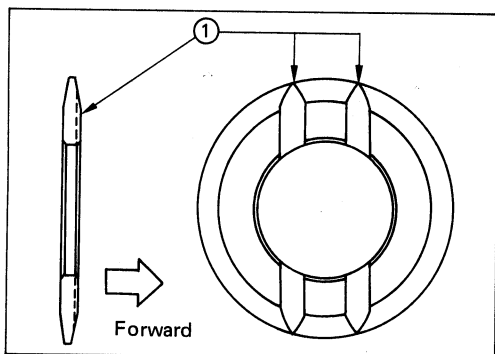


Important operations



1. 4x2/4x4 sleeve

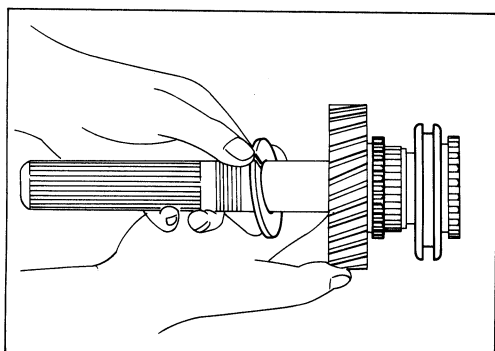
Attach the 4x2/4x4 sleeve, so that the side with the chamfering is turned rearward.



4. Thrust washer

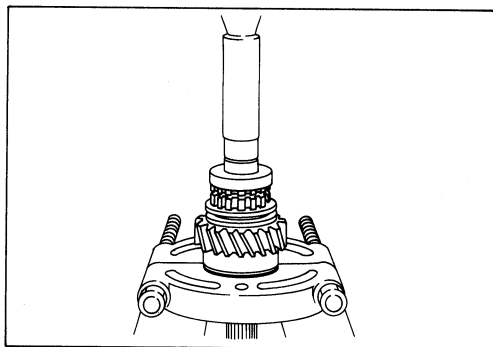
Attach the thrust washer, so that the side with the oil groove is turned forward.

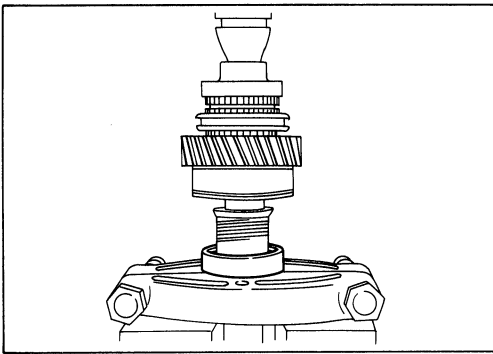
① Oil groove



5. Ball bearing

Attach the output shaft front bearing to the output shaft, so that the snapping groove is turned to the rear.



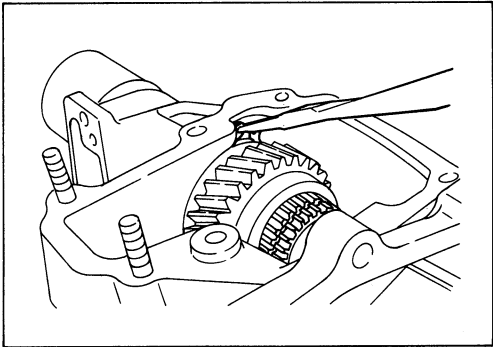
**9. Ball bearing**

Press the output shaft rear bearing into position with the face seal turned to the rear.

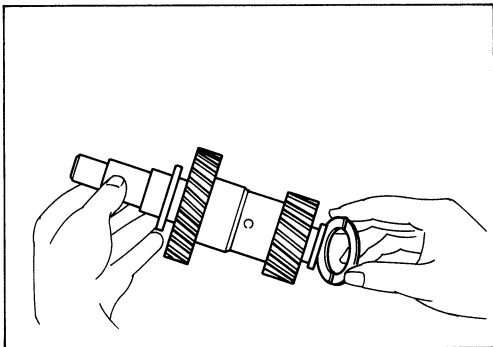
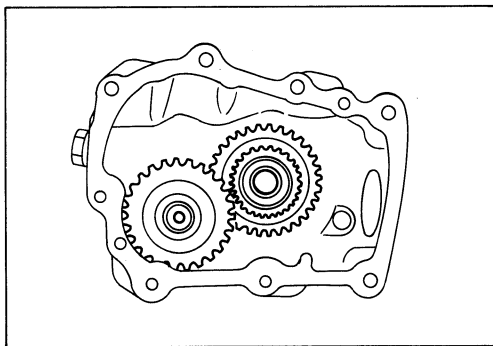
**10. Nut**

Nut hex : 41 mm (1-5/8 in.)

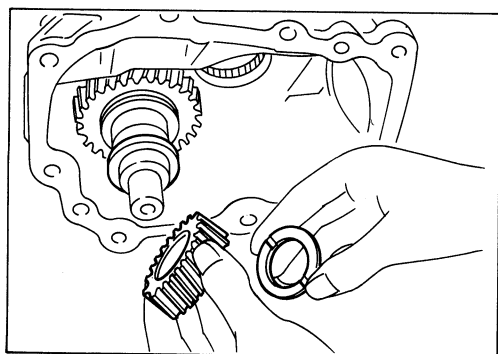
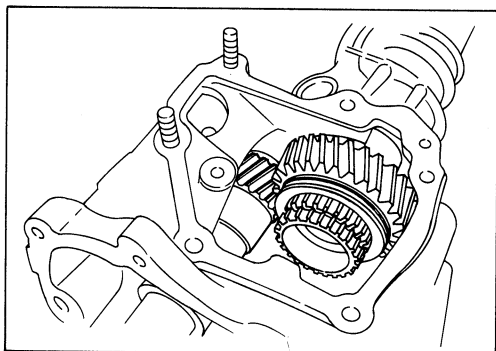
Torque	kg-m(ft.lbs.)	14 — 16 (101 — 116)
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**11. Output shaft assembly**

Insert the snap ring on the transfer case into the groove in the output shaft front bearing.

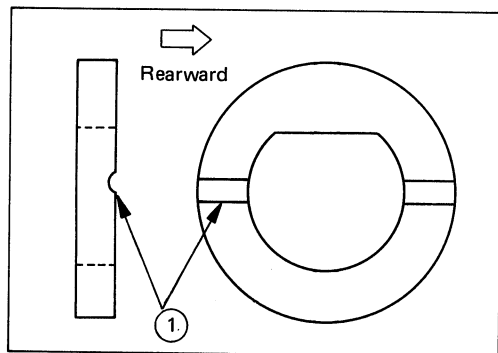
**18. Counter shaft assembly**

Install the counter shaft assembly in the case, so that the cutaway portion at front end of the counter shaft is turned in the direction shown in the figure.



19. Spacer

Insert the ball in the counter shaft, then install the spacer.



21. Thrust washer

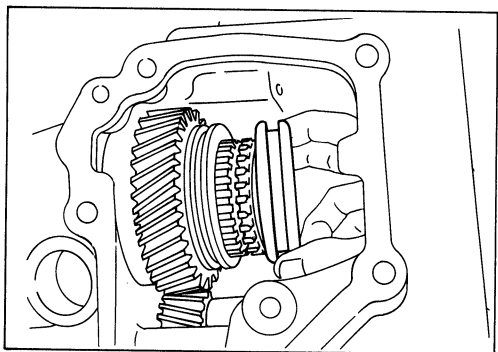
Install the thrust washer, so that the side with the oil groove is turned to rearward.

① Oil groove



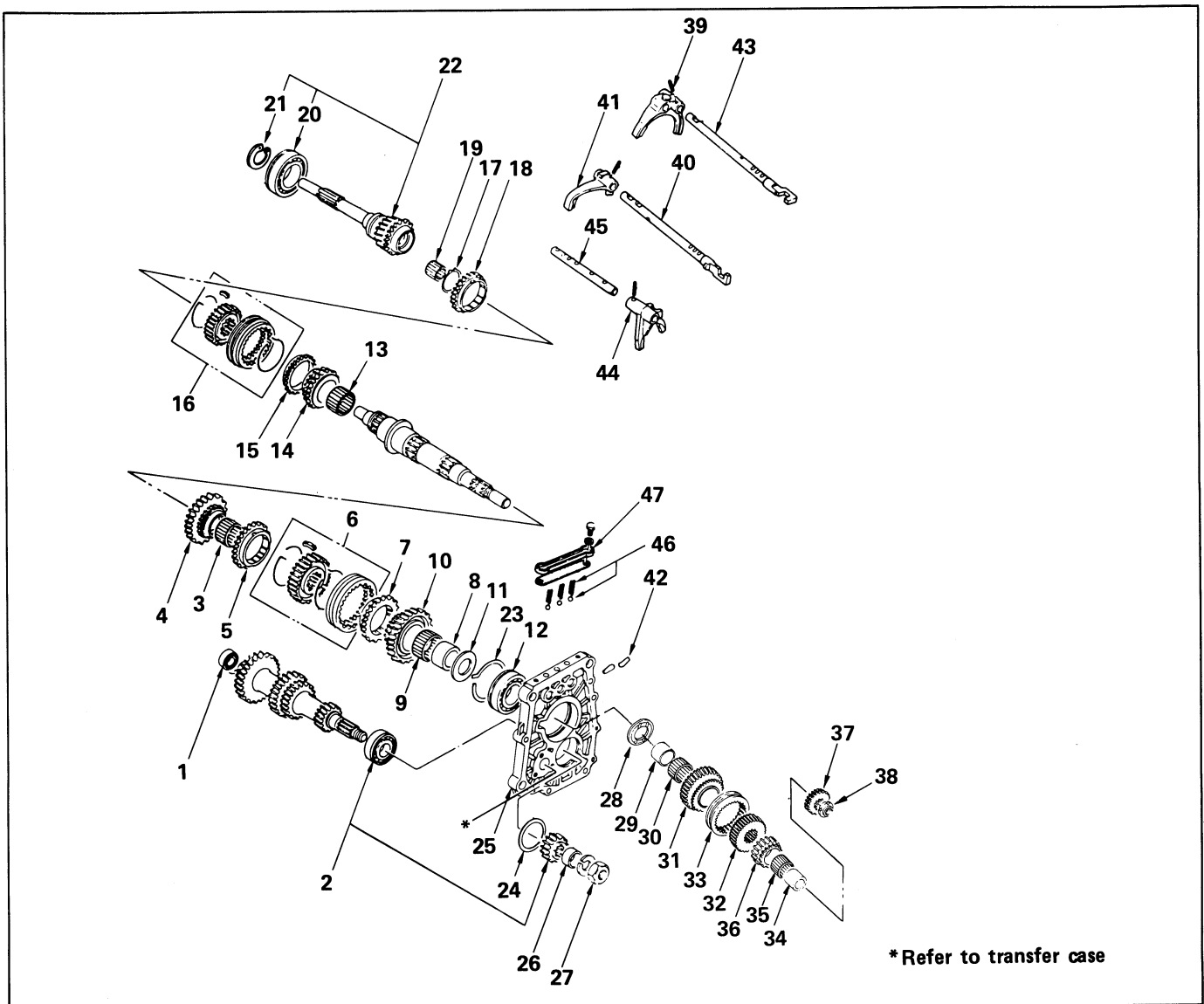
22. High/Low sleeve

Install the range shaft sleeve on the output shaft, so that the end of the sleeve with the heavy chamfering on the outer circumference is turned toward the front.



MINOR COMPONENTS

Main shaft gear assembly, cluster gear assembly and top gear shaft assembly.



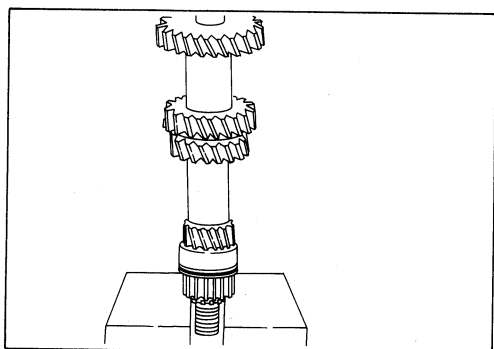
Reassembly steps

- | | | |
|---|-------------------------------------|-------------------------------------|
| 1. Cluster gear front ball bearing | ▲ 16. Top/3rd synchronizer assembly | ▲ 32. Reverse hub |
| ▲ 2. Cluster gear ball bearing and reverse counter gear | ▲ 17. Snap ring | ▲ 33. Sleeve |
| 3. Needle roller bearing | 18. Top/3rd blocker ring | 34. Collar |
| 4. 2nd gear | 19. Needle roller bearing | 35. Needle roller bearing |
| 5. Low/2nd blocker ring | ▲ 20. Top gear shaft ball bearing | 36. Transfer input gear |
| ▲ 6. Low/2nd synchronizer assembly | 21. Snap ring | ▲ 37. Transfer input hub |
| 7. Low/2nd blocker ring | 22. Top gear shaft assembly | ▲ 38. Nut |
| 8. Collar | 23. Snap ring | ▲ 39. Low/2nd shift arm |
| 9. Needle roller bearing | 24. Snap ring | 40. Top/3rd shift rod |
| 10. Low gear | ▲ 25. Intermediate plate | ▲ 41. Top/3rd shift arm |
| ▲ 11. Thrust washer | ▲ 26. Spacer | 42. Interlock pin |
| ▲ 12. Main shaft ball bearing | ▲ 27. Nut | 43. Low/2nd shift rod |
| 13. Needle roller bearing | ▲ 28. Thrust washer | ▲ 44. Reverse shift arm |
| 14. 3rd gear | 29. Collar | 45. Reverse shift rod |
| 15. Top/3rd blocker ring | 30. Needle roller bearing | ▲ 46. Detent ball and detent spring |
| | 31. Reverse gear | 47. Detent spring plate |

* Refer to transfer case



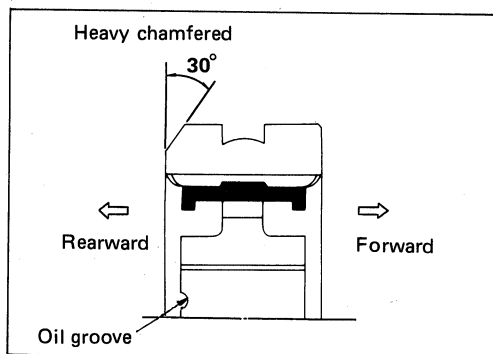
Important operations



2. Cluster gear ball bearing and reverse counter gear

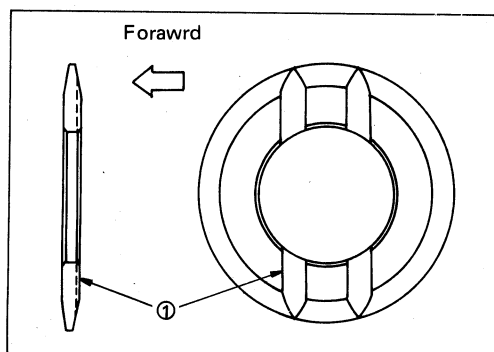
Install the bearing with the snap ring groove turned to the counter reverse gear.

The reverse counter gear should be installed so that the end with the boss is turned forward the bearing.



6. Low/2nd synchronizer assembly

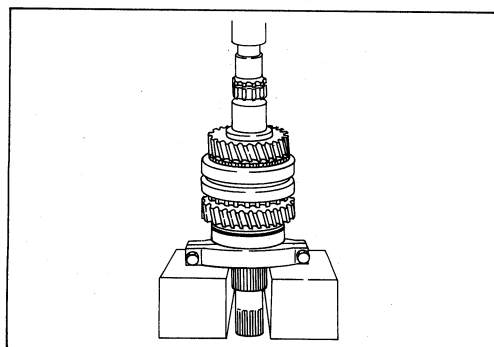
When reassembly the synchronizer assembly, the side of the clutch hub with the oil groove must face the heavy chamfer of the sleeve.



11. Thrust washer

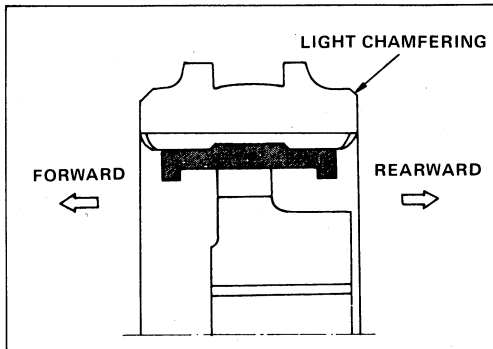
Attach the thrust washer, so that the side with the oil groove is turned forward (Low gear).

① Oil groove

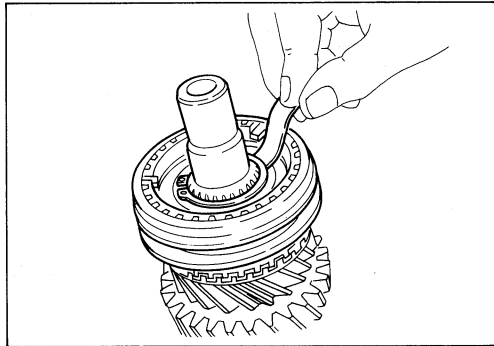


12. Main shaft ball bearing

Install the main shaft ball bearing so that the side with the snap ring groove is turned to the rear.

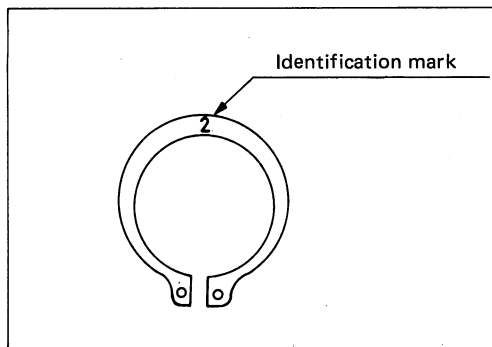
**16. Top/3rd synchronizer assembly**

When reassembling the synchronizer assembly, the side of the hub with the higher boss must face the light chamfer of the sleeve.

**17. Snap ring**

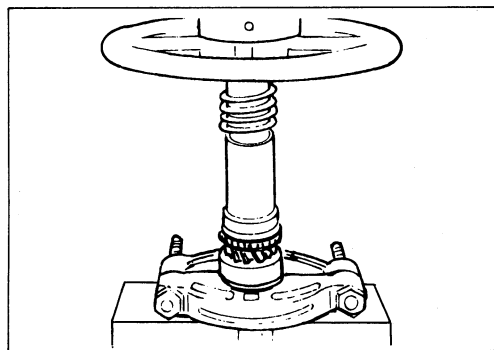
Clearance between Top/3rd clutch hub and snap ring.

Standard	mm(in.)	0 — 0.05 (0 — 0.0019)
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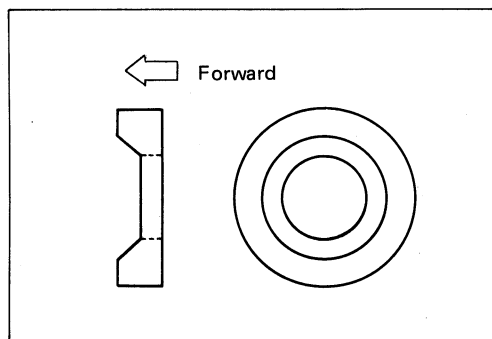


Thickness of available snap ring.

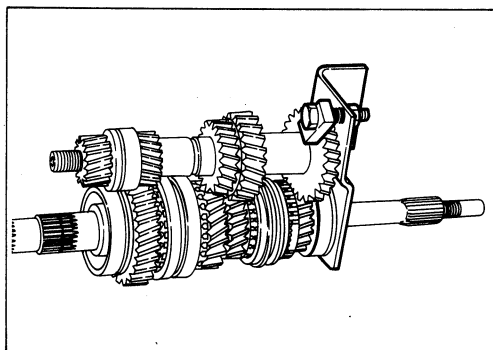
Thickness		Identification mark
Millimeters	Inches	
1.50	0.059	1
1.55	0.061	2
1.60	0.063	3
1.65	0.065	4

**20. Top gear shaft ball bearing**

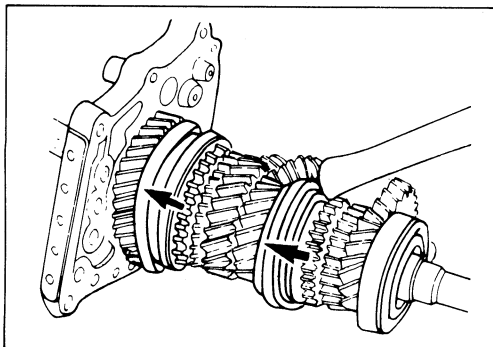
Install the top gear shaft ball bearing, so that the side with the snap ring groove is turned forward.

**26. Spacer**

Install the spacer with the tapered face turned forward.

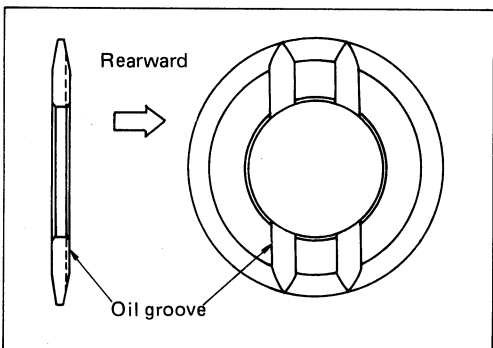
**25. Intermediate plate**

Mesh the countergear with the mainshaft assembly and attach Tool J-29768 to the mainshaft and the countergear. Place Tool J-29768 with the mainshaft and countergear assembled in a vise, then install the intermediate plate.

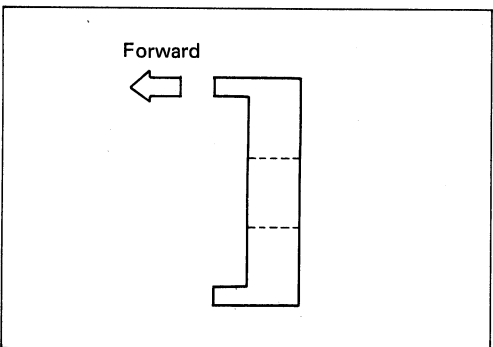
**27. Nut**

Engage the Top/3rd and Low/2nd synchronizers with the 3rd and Low gear, then attach and tighten the lock nuts to the specified torque as follow.

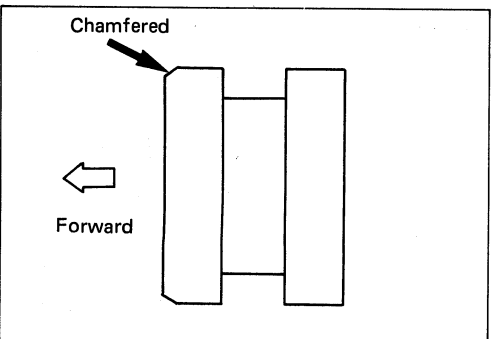
Torque	kg-m(ft.lbs.)	10 — 12 (72 — 87)
--------	---------------	-------------------

**28. Thrust washer**

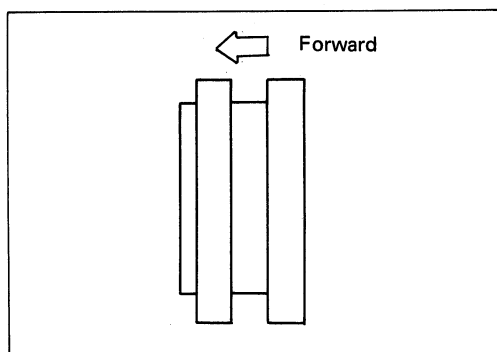
Install the thrust washer, so that the side with the oil groove is turned rearward (reverse gear).

**32. Reverse hub**

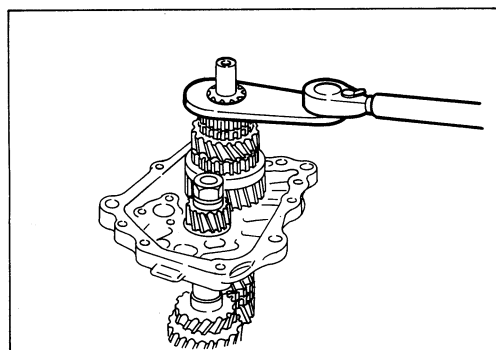
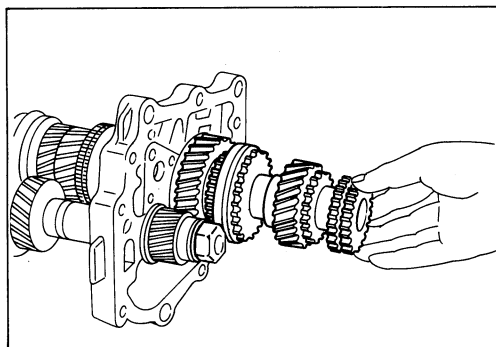
Install the reverse hub with projection edge turned forward.

**33. Sleeve**

Install the sleeve, so that the side with chamfering is turned forward.

**37. Transfer input hub**

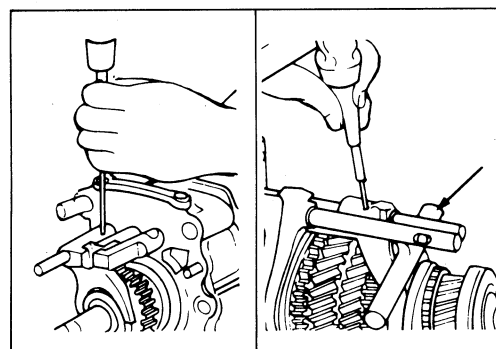
Install the transfer input hub, so that the side with chamfering is turned forward.

**38. NUT**

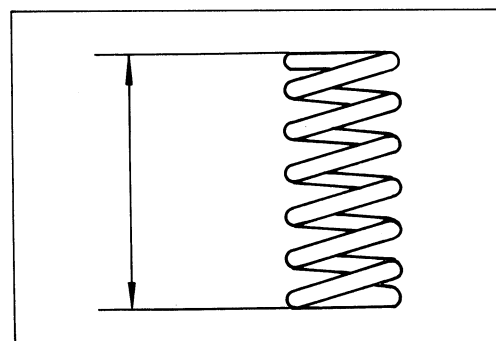
Discard the used nut and install new one at reassembly. Caulk the nut after tightening it to the specified torque.

Torque	kg-m(ft.lbs.)	10 — 12 (72 — 87)
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Wrench : J-29041

**39. Low/2nd shift arm****41. Top/3rd shift arm****44. Reverse shift arm**

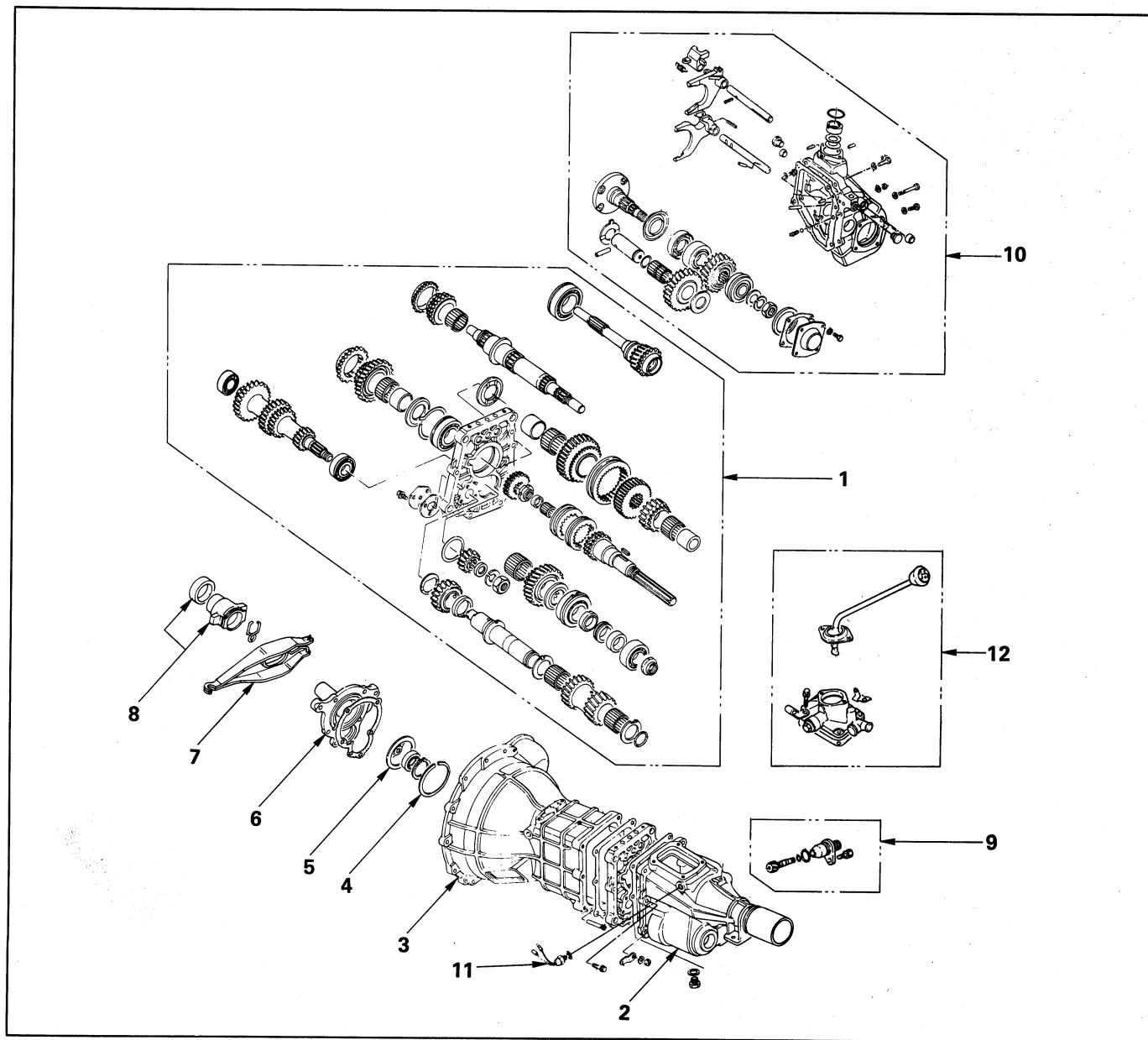
When installing the spring pin, hold a round bar against the lower face of the shift rod end to protect it against damage. Discard the used spring pin and install a new one at reassembly.

**46. Detent ball and detent spring**

The detent spring for reverse is shorter in length than those for Low/2nd and Top/3rd.

	mm(in.)
	Free length
Low/2nd, Top/3rd	30.5 (1.202)
Rev.	27.7 (1.091)

MAJOR COMPONENTS

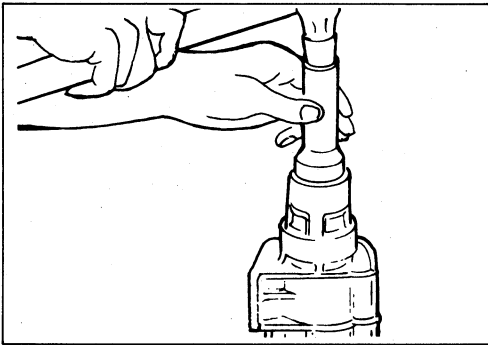


Reassembly steps

- | | |
|--|-------------------------------------|
| 1. Main gear shaft assembly, cluster gear assembly and top gear shaft assembly | 7. Withdraw lever |
| ▲ 2. Transfer case | ▲ 8. Shift block |
| 3. Transmission case | 9. Speedometer driven gear assembly |
| 4. Snap ring | 10. Transfer side case assembly |
| ▲ 5. Belleville spring | 11. Back-up light switch |
| ▲ 6. Front cover | 12. Shift lever and quadrant box |

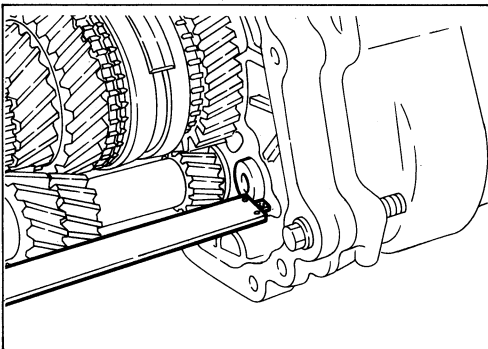


Important operations



2. Transfer case

Installation of transfer case rear oil seal.
Installer : J-29769

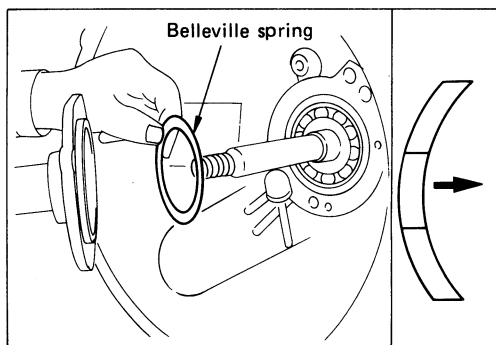


Tighten evenly the four bolts holding the transfer case and intermediate plate.



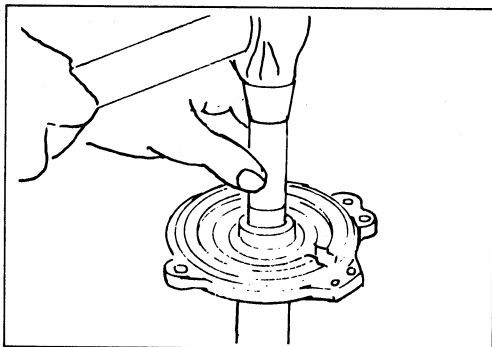
Measure the distance between the front face of the intermediate plate and the end of the transfer countershaft and select the distance piece by referring to the following table.

Standard	mm(in.)	0.1 — 0.35 (0.004 — 0.014)
mm(in.)		
Thickness of Distance Shim	Measured value (A)	Marking color
3.0 (0.118)	2.7 — 2.9 (0.106 — 0.114)	Red
3.2 (0.126)	2.9 — 3.1 (0.114 — 0.122)	Orange
3.4 (0.134)	3.1 — 3.3 (0.122 — 0.130)	Yellow
3.6 (0.142)	3.3 — 3.5 (0.130 — 0.138)	Green
3.8 (0.150)	3.5 — 3.6 (0.138 — 0.142)	Blue



5. Belleville spring

Install the belleville spring with dished side turned to bearing as illustrated in the drawing.



6. Front cover

Install the front cover oil seal.
Setting tool : J-26540



Torque	kg-m(ft.lbs.)	1.5 — 2.3 (10.8 — 16.6)
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Apply adhesive (seat end No. 22) to the threaded portion of the through bolt on the left lower side of the transmission case (as viewed from front side of the case) before installation.



8. Shift block

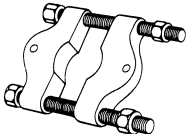
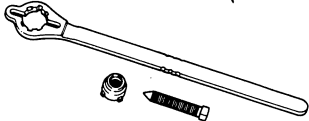
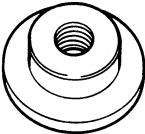
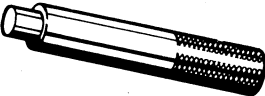
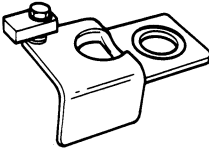
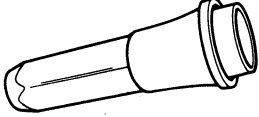
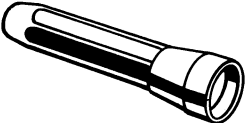
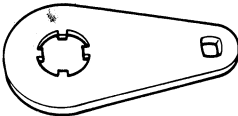
Apply grease to the inner face of the shift block.
Check that hook on the withdraw lever is fitted to the support properly.

DIAGNOSIS

TROUBLE DIAGNOSIS

Condition	Possible Cause	Correction
Hard Shifting	1. Clutch 2. Synchronizers worn or broken. 3. Shift shafts or forks worn.	1. Adjustment 2. Replace 3. Replace
Slips out of Gear	1. Shift shafts worn. 2. Bearings worn. 3. Drive gear retainer broken or loose. 4. Excessive play in synchronizers.	1. Replace 2. Replace as necessary. 3. Tighten or replace retainer. 4. Replace
Noisy in All Gears	1. Insufficient lubricant. 2. Worn countergear bearings. 3. Worn or damaged drive gear and countergear. 4. Damaged drive gear or main shaft 5. Worn or damaged countergear.	1. Fill to correct level. 2. Replace countergear bearings and shaft. 3. Replace worn or damaged gears. 4. Replace damaged bearings or drive gear. 5. Replace countergear.
Noisy in Neutral	1. Damaged drive gear bearing. 2. Damaged or loose pilot bearing. 3. Worn or damaged countergear. 4. Worn countergear bearings.	1. Replace damaged bearing. 2. Replace pilot bearing. 3. Replace countergear. 4. Replace countergear bearings and shaft.
Noisy in Reverse	1. Worn or damaged reverse idler gear or idler bushing. 2. Worn or damaged reverse gear. 3. Damaged or worn countergear.	1. Replace reverse idler gear assembly. 2. Replace reverse gear. 3. Replace countergear assembly.
Leaks lubricant	1. Excessive amount of lubricant in transmission. 2. Loose or broken drive gear bearing retainer. 3. Drive gear bearing retainer gasket damaged. 4. Center support gaskets either side. 5. Rear extension seal. 6. Speedo driven gear	1. Drain to correct level. 2. Tighten or replace retainer. 3. Replace gasket. 4. Replace gaskets. 5. Replace. 6. Replace O ring seal

SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-22912-01	Bearing remover
		J-8614-01	Output flange holder
		J-29040	Output shaft bearing Remover & Installer
		J-8092	Driver handle
		J-29037	Installer oil seal
		J-29768	Holding support
		J-29769	Transfer case oil seal installer
		J-26540	Oil seal installer
		J-29041	Mainshaft locknut remover

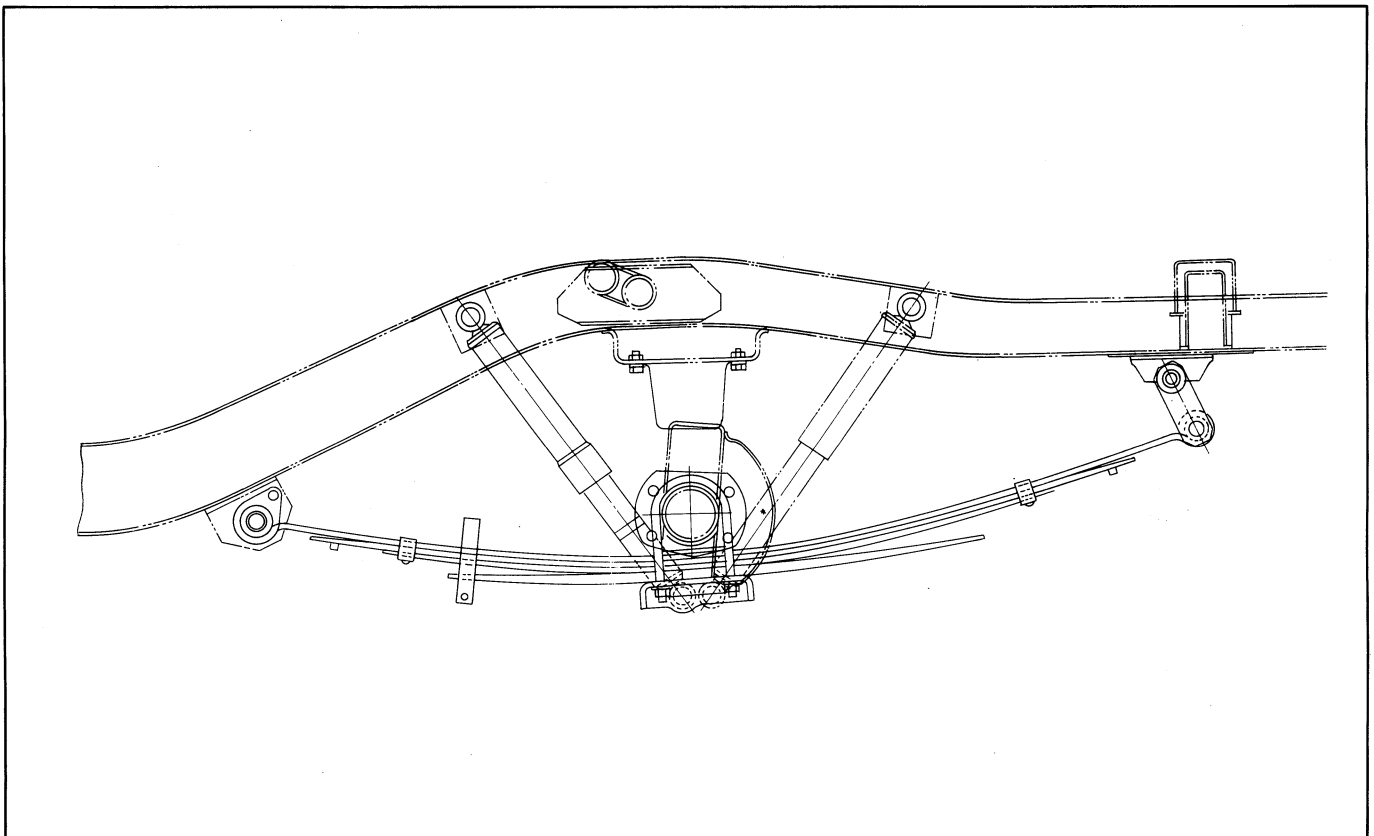
SECTION 06A

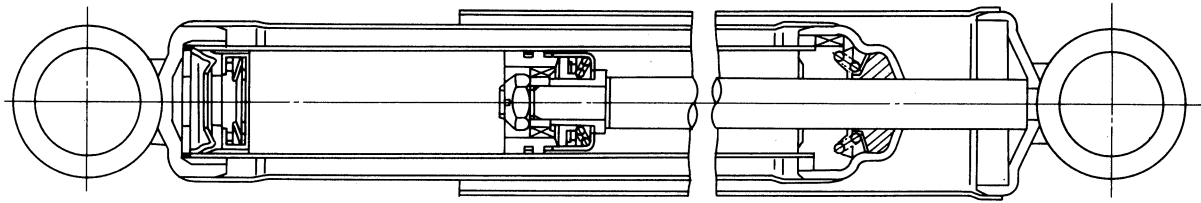
REAR SUSPENSION

INDEX

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General description	06A— 1
Main data and specifications	06A— 2
Major parts ; fixing nuts and bolts	06A— 3
Disassembly	06A— 4
Inspection and repair	06A— 6
Reassembly	06A— 7
Diagnosis	06A—10

GENERAL DESCRIPTION



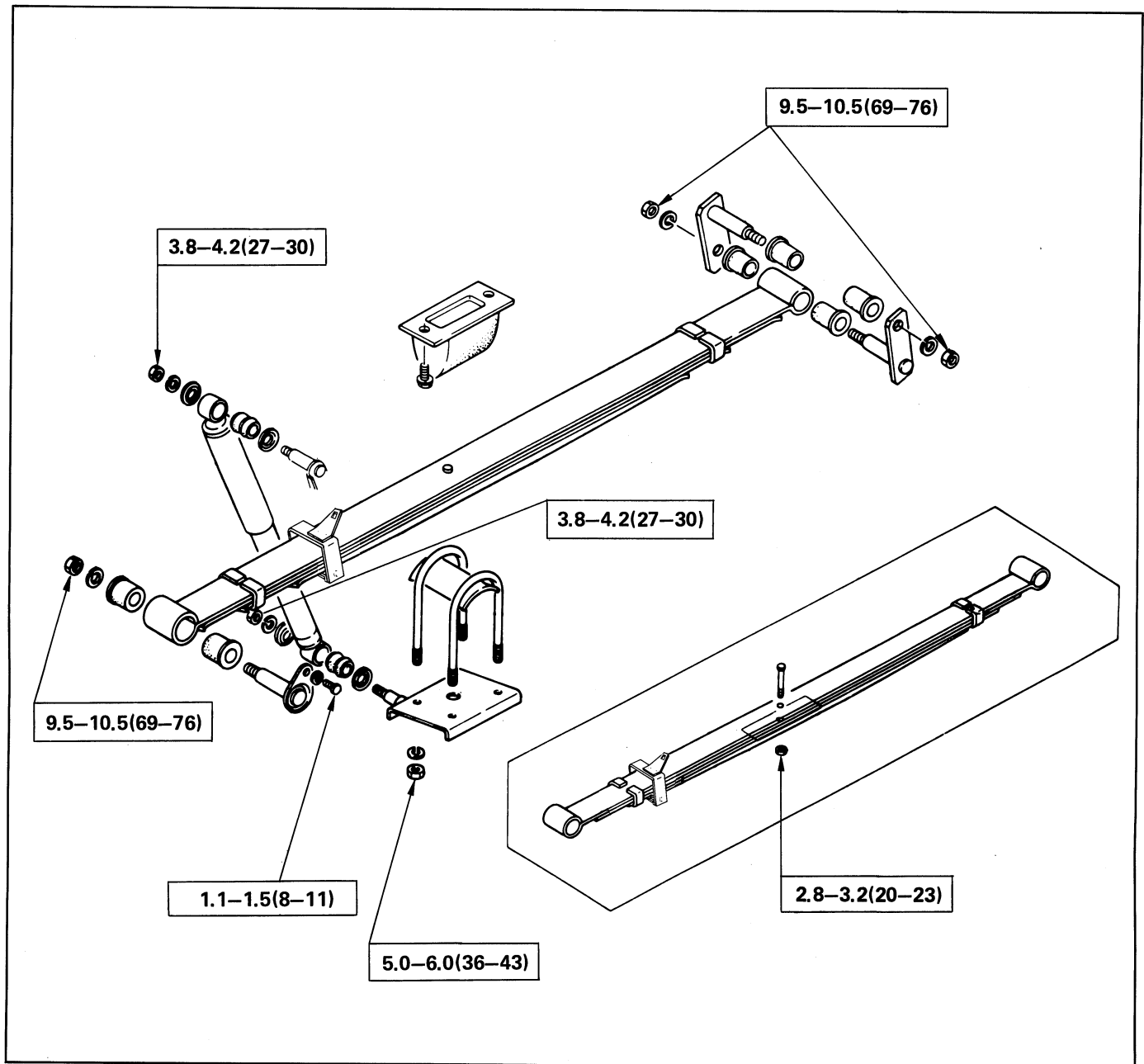


MAIN DATA AND SPECIFICATIONS

Items	
Type	Semi-elliptic, rubber bushed, leaf type springs and direct double acting shock absorbers.
Main spring	
No. of leaves	7 (0.28) ; No. 1-3
Leaf thickness — Numbered	13 (0.51) ; No. 4
(Top to bottom)	Berlin eye type
Spring eye type	Front ; 40 (1.57), Rear ; 30 (1.18)
Bushings outside dia.	1200 (47.24)
Length	60 (2.36)
Width	2.89/6.09
Rate — Unclamped	3.15/6.63
Clamped	600 (1323)
Rear spring capacity	15 (33.1)
Weight	
Rear shock absorbers	
Type	Hydraulic, double acting, telescopic
Piston diameter	25 (0.98)
Mean stroke	230 (9.06)
Compressed length	338 (13.31)
Extended length	568 (22.36)
Bump rubber	
Height	82 (3.23)

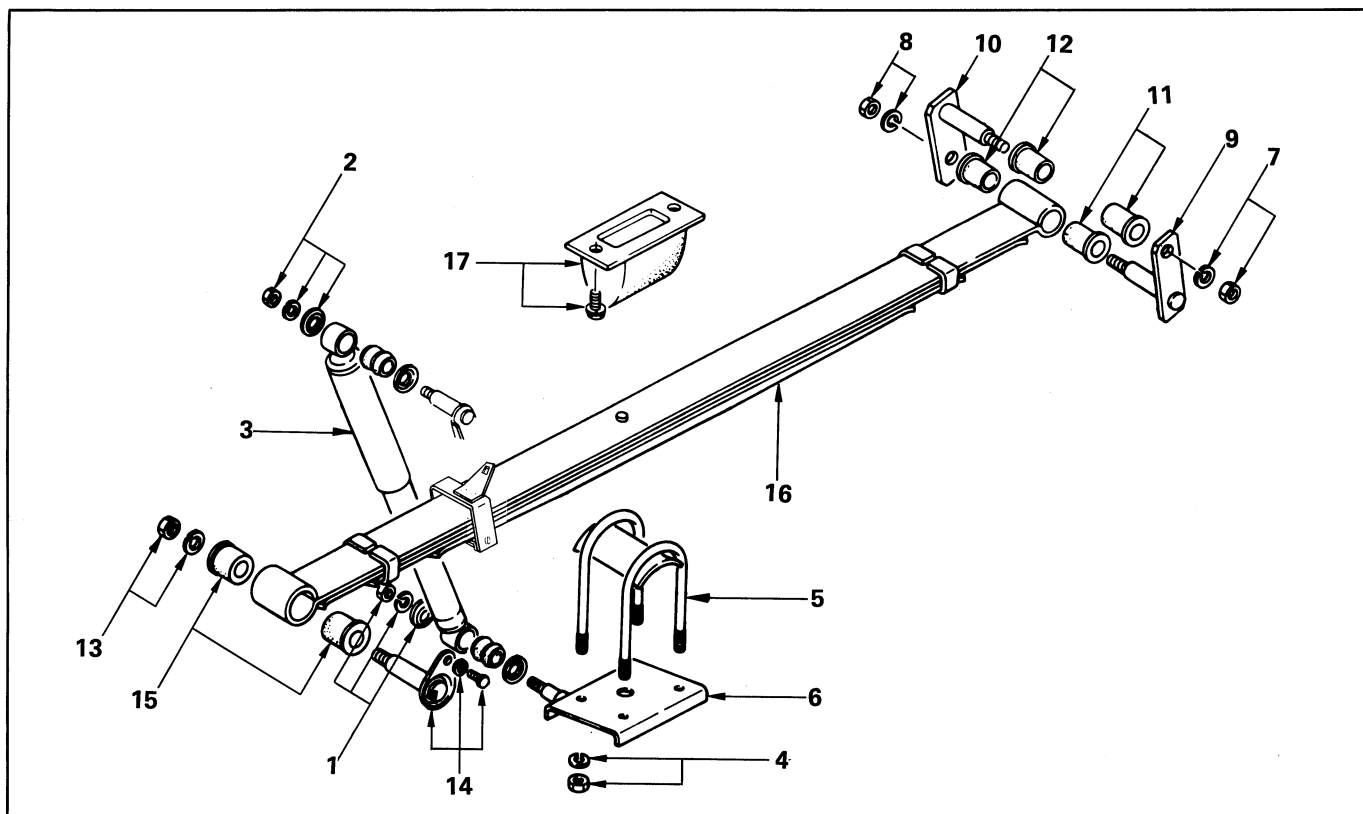
MAJOR PARTS ; FIXING NUTS AND BOLTS

kg-m(ft.lbs.)





DISASSEMBLY



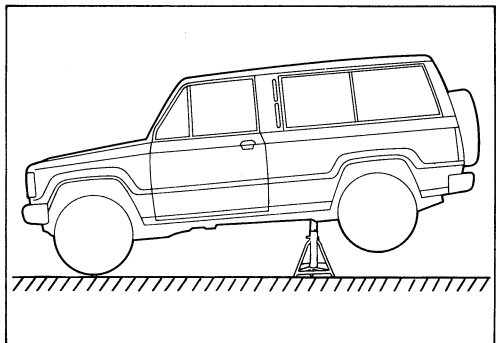
Disassembly steps

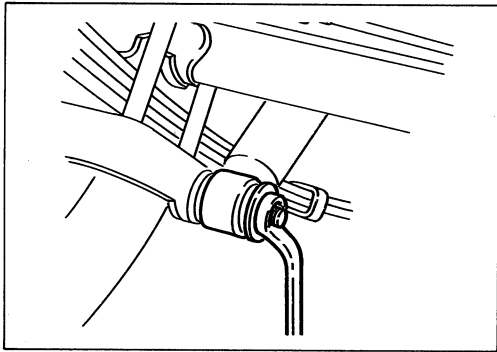
- | | |
|---------------------|-----------------------------------|
| ▲ 1. Nut and washer | ▲ 10. Shackle |
| ▲ 2. Nut and washer | 11. Rubber bushing |
| 3. Shock absorber | 12. Rubber bushing |
| ▲ 4. Nut and washer | ▲ 13. Nut and washer |
| ▲ 5. U-bolt | ▲ 14. Bolt, washer and spring pin |
| 6. Lower clamp | 15. Bushing |
| ▲ 7. Nut and washer | 16. Leaf spring assembly |
| ▲ 8. Nut and washer | 17. Bolt and bump rubber |
| ▲ 9. Shackle | |



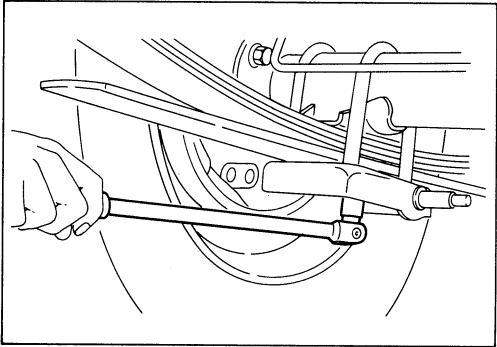
Important operations

Jack up the rear axle and place chassis stands under the frame near the rear end of the rear spring brackets.



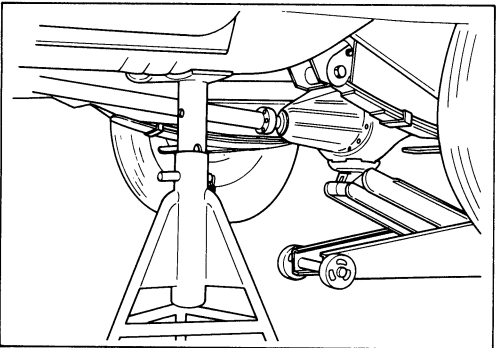


1. 2. Nut and washer

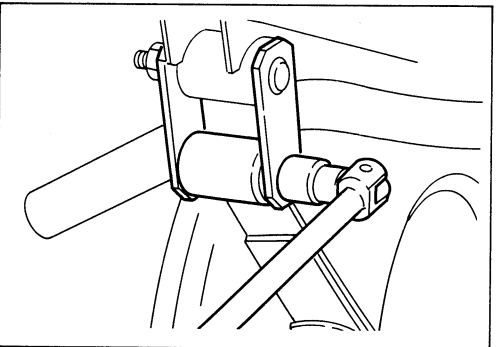


4. Nut and washer

5. U-bolt



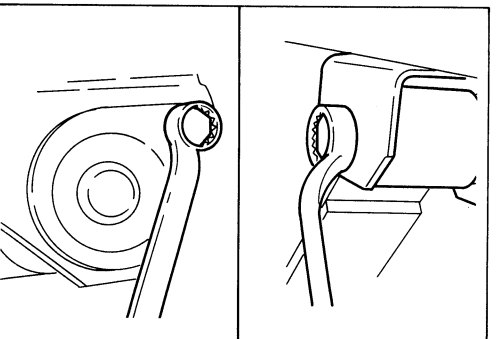
Jack up the rear axle case slightly to separate it from the leaf spring assemblies.



7. 8. Nut and washer

9. 10. Shackle

Remove the nut and drive out the shackle with a hammer and a brass bar.



13. 14. Nut, washer, bolt and spring pin

Remove the nut and drive out the spring pin with a hammer and a brass bar.



INSPECTION AND REPAIR

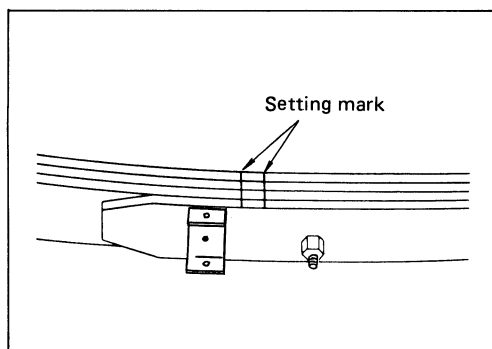
Make all necessary adjustments, repairs, and part replacement if wear, damage, or other problems are discovered during inspection.

- Leaf spring assembly
- Clip
- Center bolt
- U-bolt
- Spring pin
- Shackle pin
- Shock absorber
- Bumper rubber
- Rubber bushing
- Bumper rubber seat



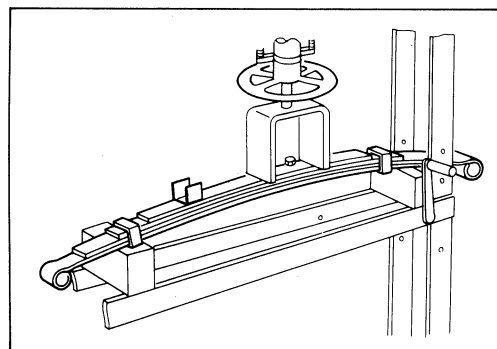
Visual check

Inspect the following parts for wear, damage or their abnormal conditions.



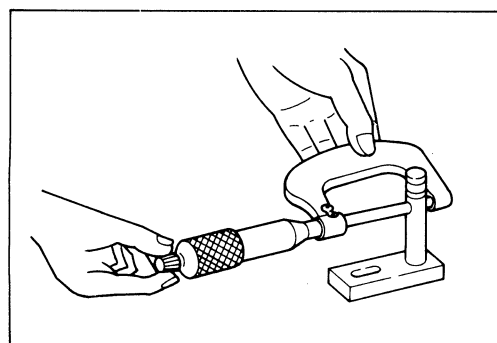
Leaf spring assembly replacement

- Apply a setting mark across the springs before disassembling the leaf spring assembly.
- Apply grease to both faces of each leaf spring at assembly.
- Use a bench press for disassembly and reassembly.
- Discard the center bolt and install a new one.



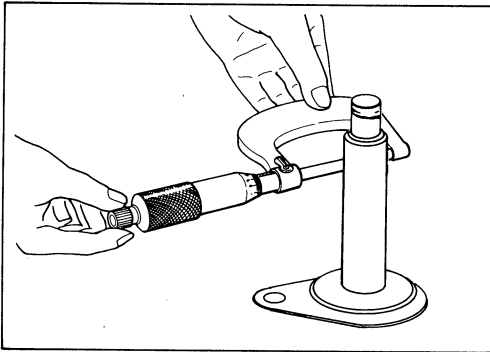
Center bolt

Torque	kg-m(ft.lbs.)	2.8 — 3.2 (20 — 23)
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Shackle pin diameter

Standard	mm(in.)	17.93 — 18.00 (0.706 — 0.709)
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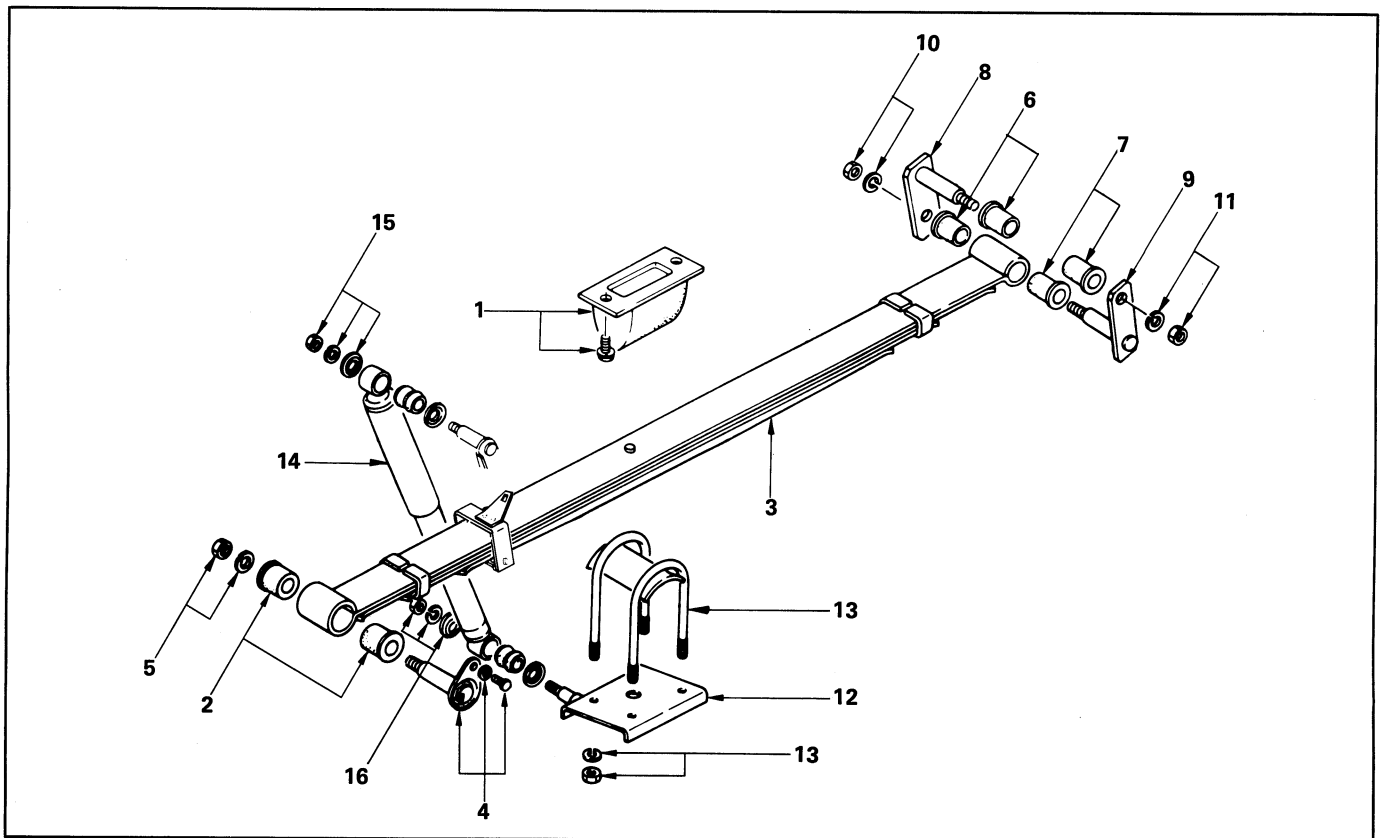


Spring pin diameter

Standard	mm(in.)	17.93 — 18.00 (0.706 — 0.709)
----------	---------	-------------------------------



REASSEMBLY

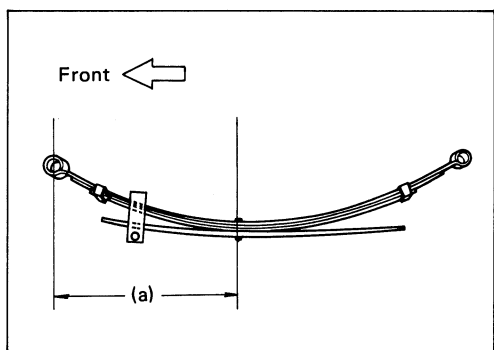


Reassembly steps

- | | |
|--------------------------------|----------------------|
| 1. Bump rubber | ▲ 9. Shackle |
| 2. Bushing | ▲ 10. Nut and washer |
| ▲ 3. Leaf spring assembly | ▲ 11. Nut and washer |
| 4. Spring pin, bolt and washer | 12. Lower clamp |
| ▲ 5. Nut and washer | ▲ 13. U-bolt and nut |
| ▲ 6. Rubber bushing | ▲ 14. Shock absorber |
| ▲ 7. Rubber bushing | ▲ 15. Nut and washer |
| ▲ 8. Shackle | ▲ 16. Nut and washer |

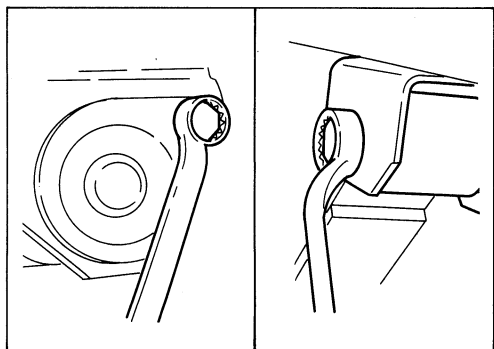


Important operations



3. Leaf spring assembly

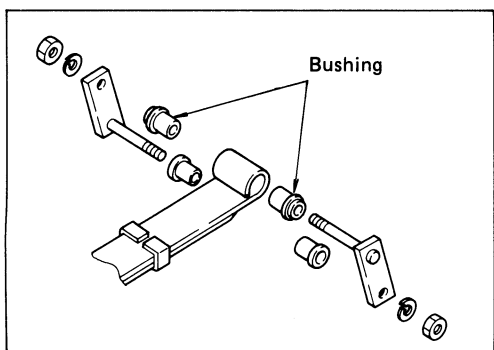
The leaf spring assembly should be installed so that the side with the shorter length (a) (distance between center bolt and center of spring eye) is turned to the front side.



5. Nut and washer

kg-m(ft.lbs.)

	Torque
Spring pin nut	9.5 — 10.5 (69 — 76)
Bolt	1.1 — 1.5 (8 — 11)



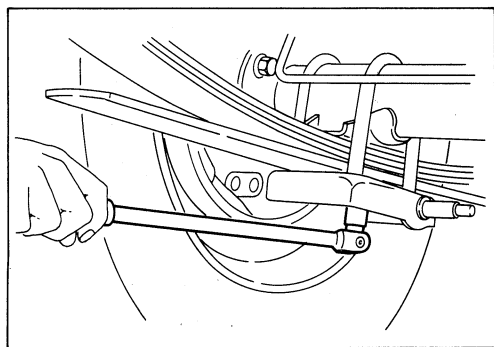
6. 7. Rubber bushing

8. 9. Shackle

10. 11. Nut and washer

Install bushing with collar on the leaf spring, then install and tighten the nut.

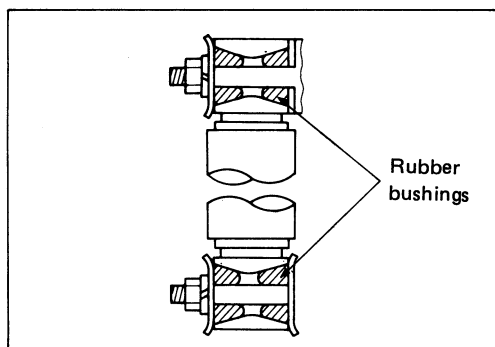
Torque	kg-m(ft.lbs.)	9.5 — 10.5 (69 — 76)
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13. U-bolt and nut

When tightening the nuts, apply oil as necessary to prevent damaging the threads.

Torque	kg-m(ft.lbs.)	5.0 — 6.0 (36 — 43)
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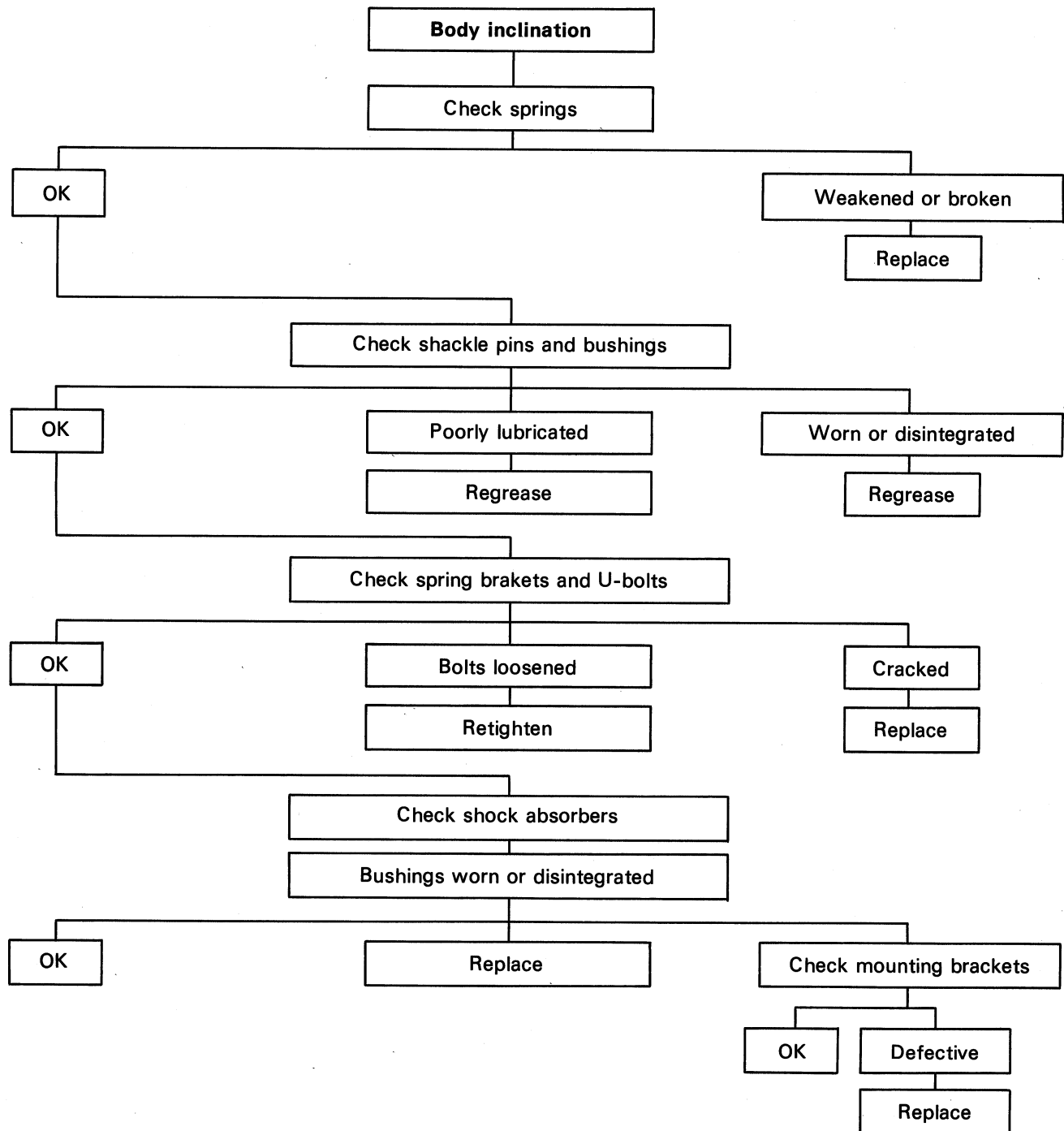
14. Shock absorber

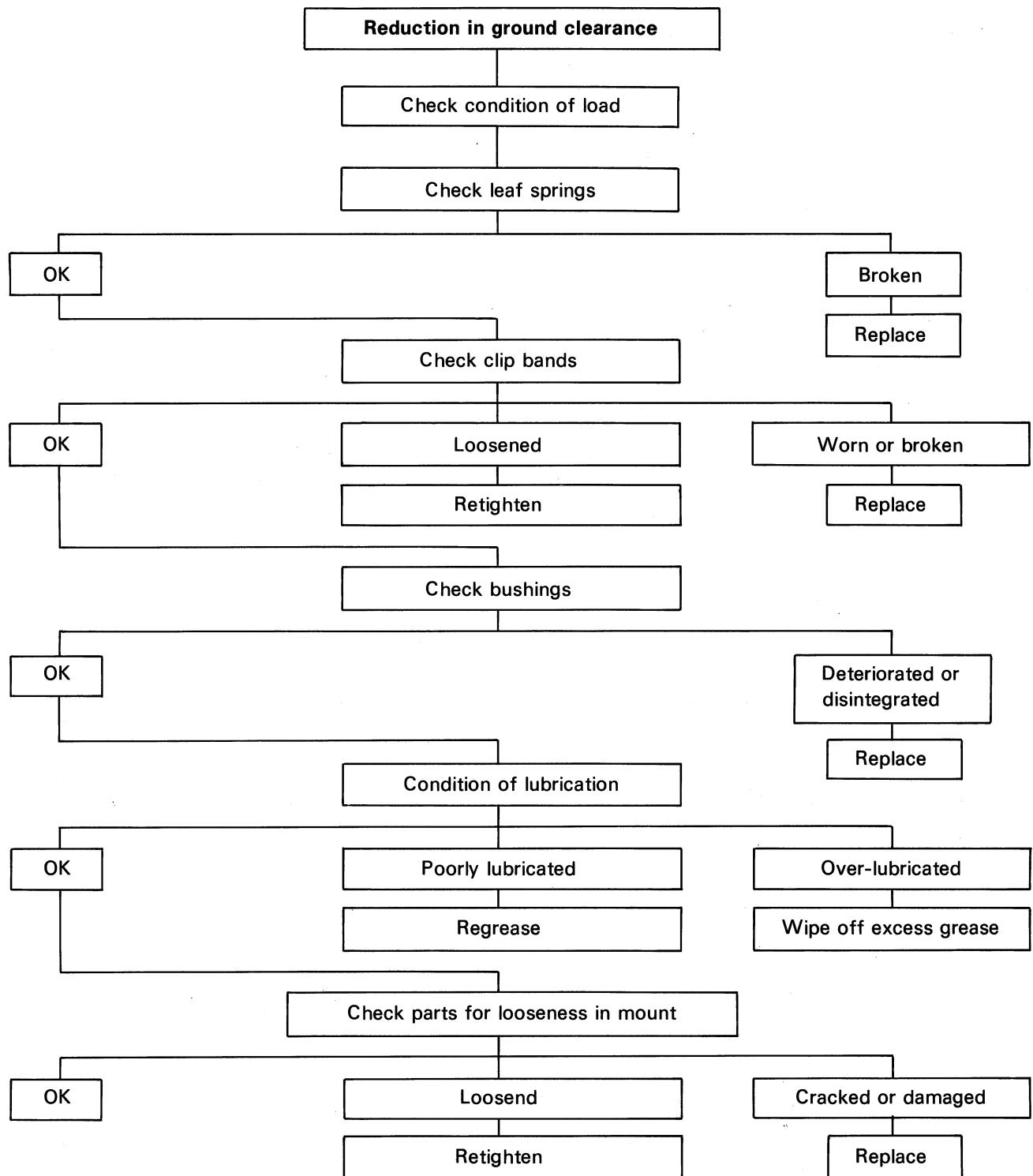
15. 16. Nut and washer

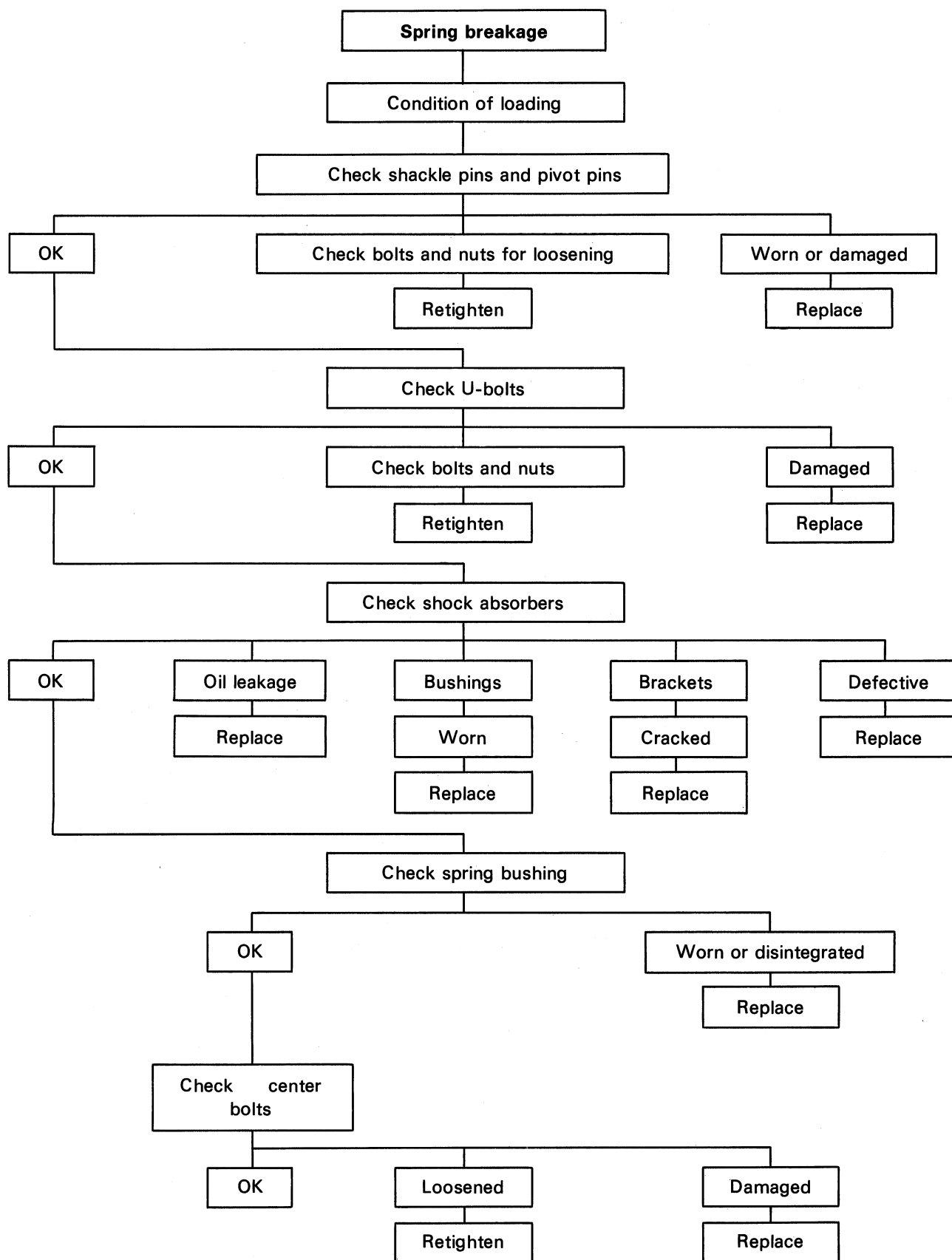
Refer to the drawing for parts installation.

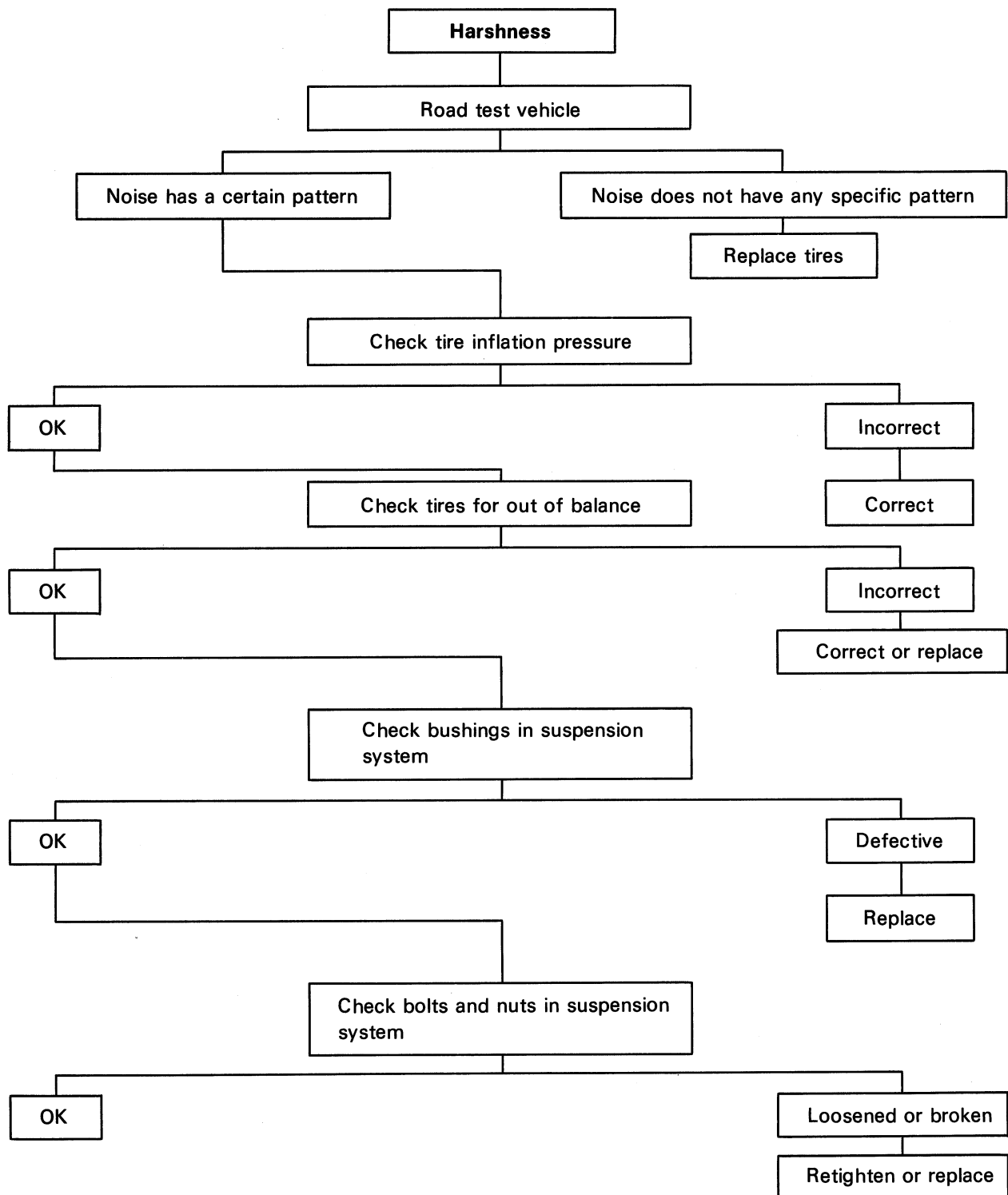


Torque	kg-m(ft.lbs.)	3.8 — 4.2 (27 — 30)
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DIAGNOSIS







This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dashed lines, providing a guide for letter height and placement. The lines are evenly spaced across the entire page, which is otherwise blank. There are no margins, titles, or other markings present.

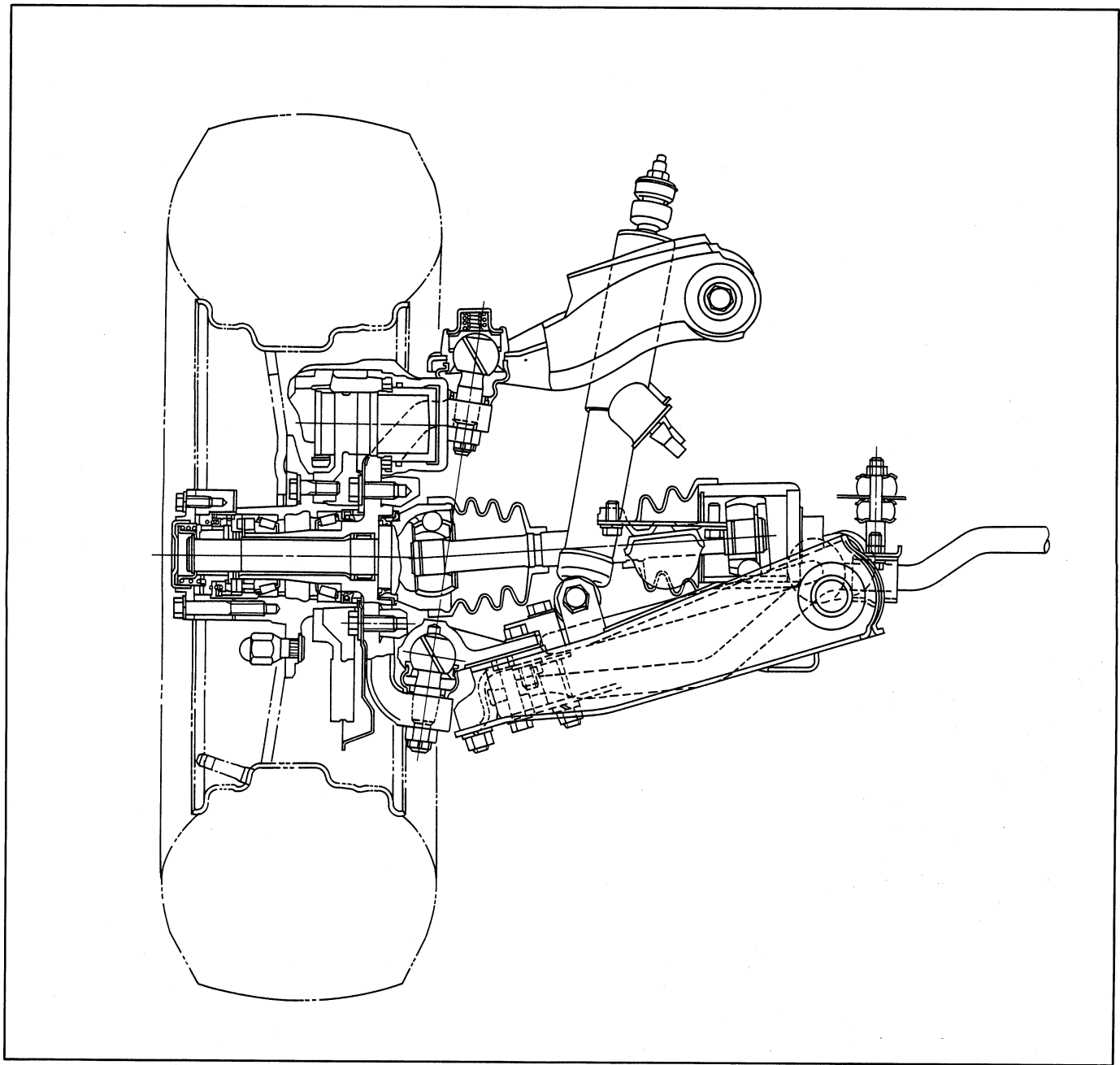
SECTION 06

FRONT SUSPENSION

INDEX

CONTENTS	PAGE
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Torsion bar, strut bar, stabilizer bar and shock absorber	06— 6
Knuckle, upper link and lower link	06—11
Diagnosis	06—18
Special tools	06—30

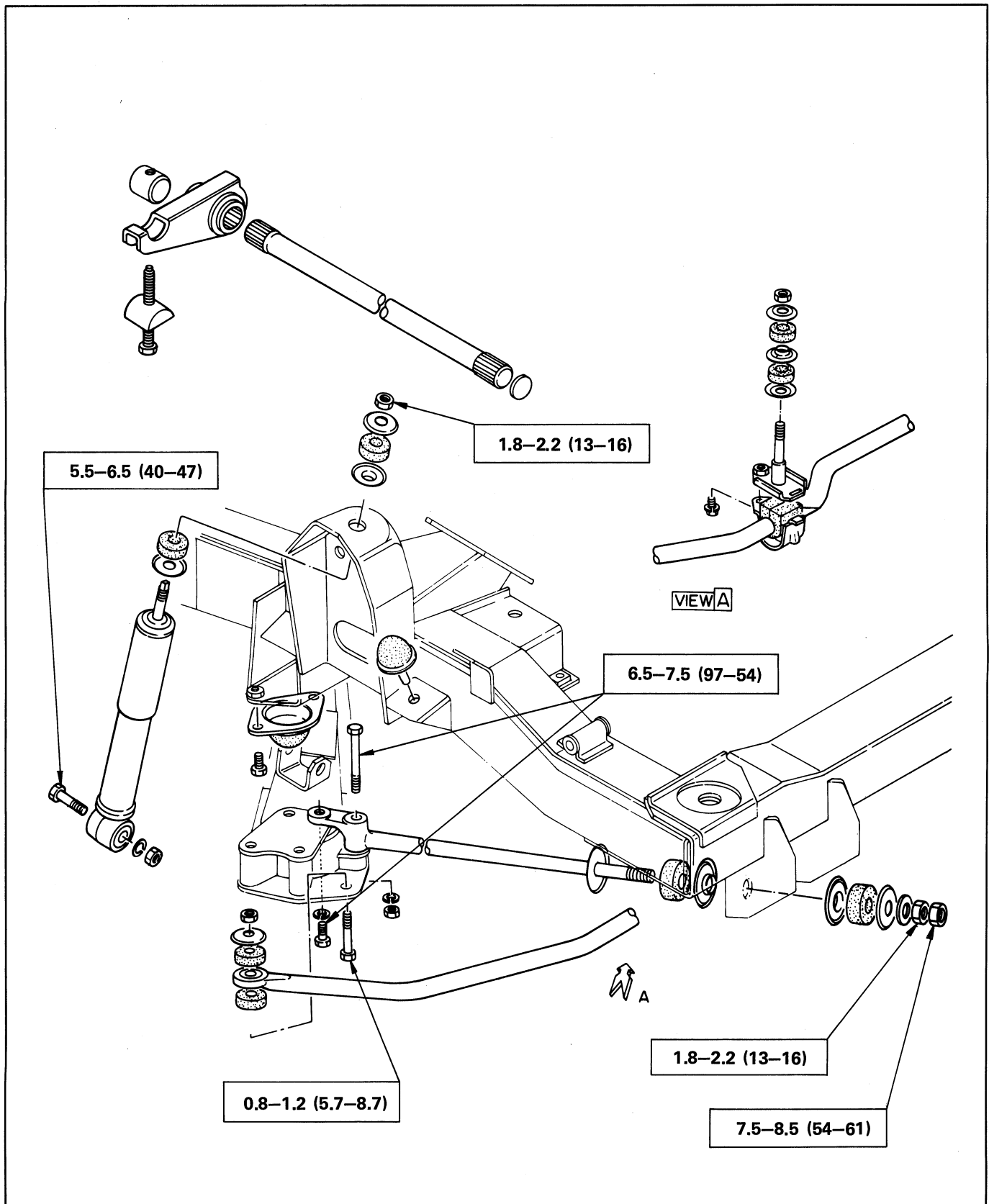
GENERAL DESCRIPTION



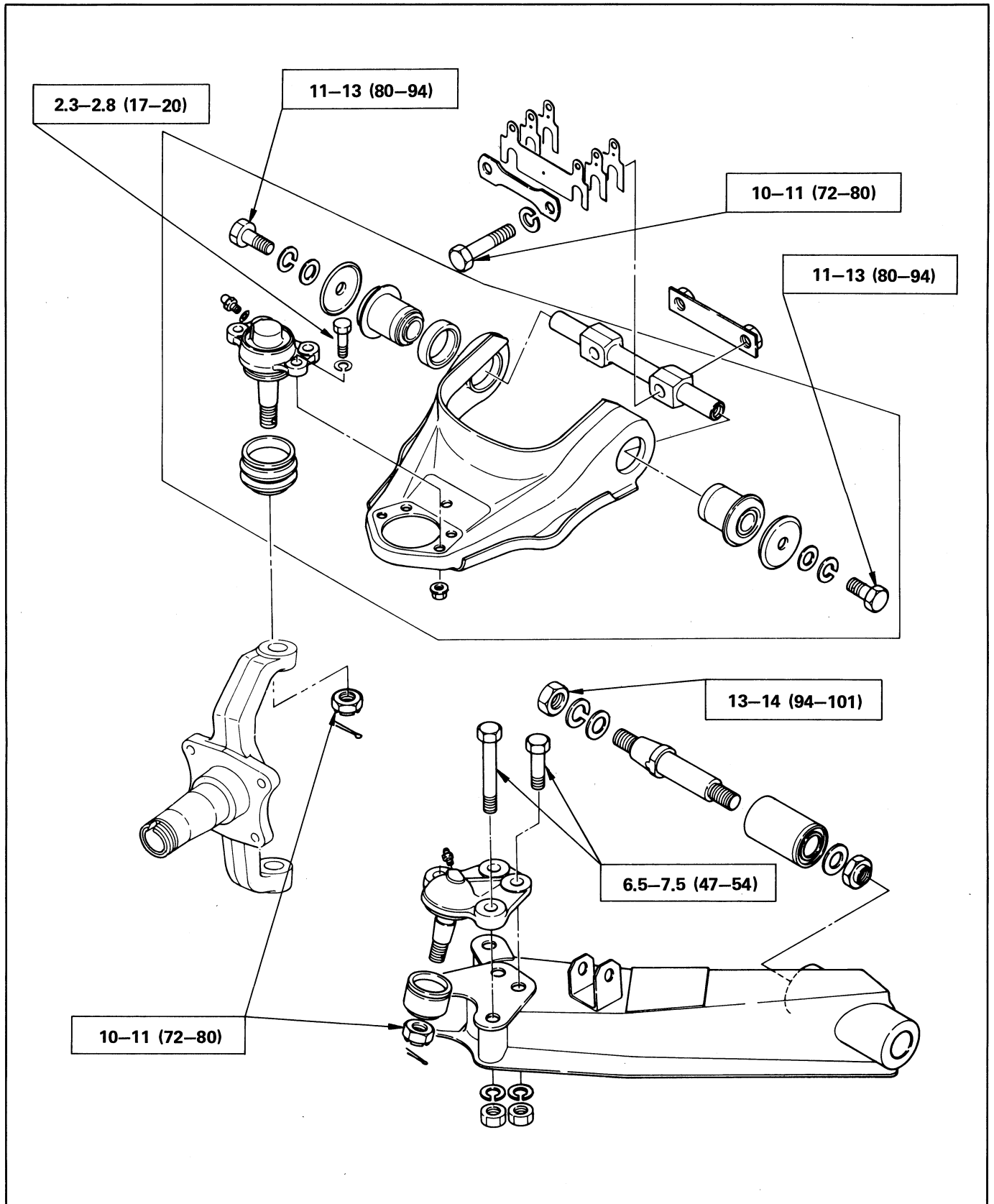
MAIN DATA AND SPECIFICATIONS

Front wheel alignment		
When not loaded		
Tread	mm(in.)	1385 (54.5)
Camber		+35' ± 30'
Caster		+30' ± 30'
Toe-in	mm(in.)	0 ± 2 (0.08)
Kingpin inclination		7°25' ± 30'
Front suspension		
Type		Independent wishbone arms, torsion bar springs with stabilizer bar
Axle capacity	kg(lbs.)	950 (2,095)
Tread	mm(in.)	1385 (54.5)
Spherical Joints		Metallic
Upper — Ball Stud		Taper fit in knuckle and secured by nut
Socket		Installed in upper arm and secured by nut
Lower — Ball Stud		Taper fit in knuckle and secured by nut
Socket		Installed in lower arm and secured by nut
Bump Rubber		
Material		Black rubber
		Attached to bracket weld on bottom of frame
Rebound Rubber		
Material		Black rubber
Location		Attached to bracket weld on side of frame
Front spring		
Type		Torsion Bar
No. of Springs		2
Diameter	mm(in.)	23.3 (0.92)
Length	mm(in.)	927 (36.50)
Rate — without Bush	kg/mm	2.51
with Bush	kg/mm	2.69
Front Spring Capacity	kg(lbs.)	475 (1.047)
Front shock absorbers		
Type		Hydraulic, double acting, telescopic
Piston diameter	mm(in.)	23 (0.98)
Mean stroke	mm(in.)	130 (5.12)
Compressed Length	mm(in.)	225 (8.86)
Extended Length	mm(in.)	355 (13.98)
Stabilizer Bar		
Diameter	mm(in.)	23 (0.91)

MAJOR PARTS ; FIXING NUTS AND BOLTS



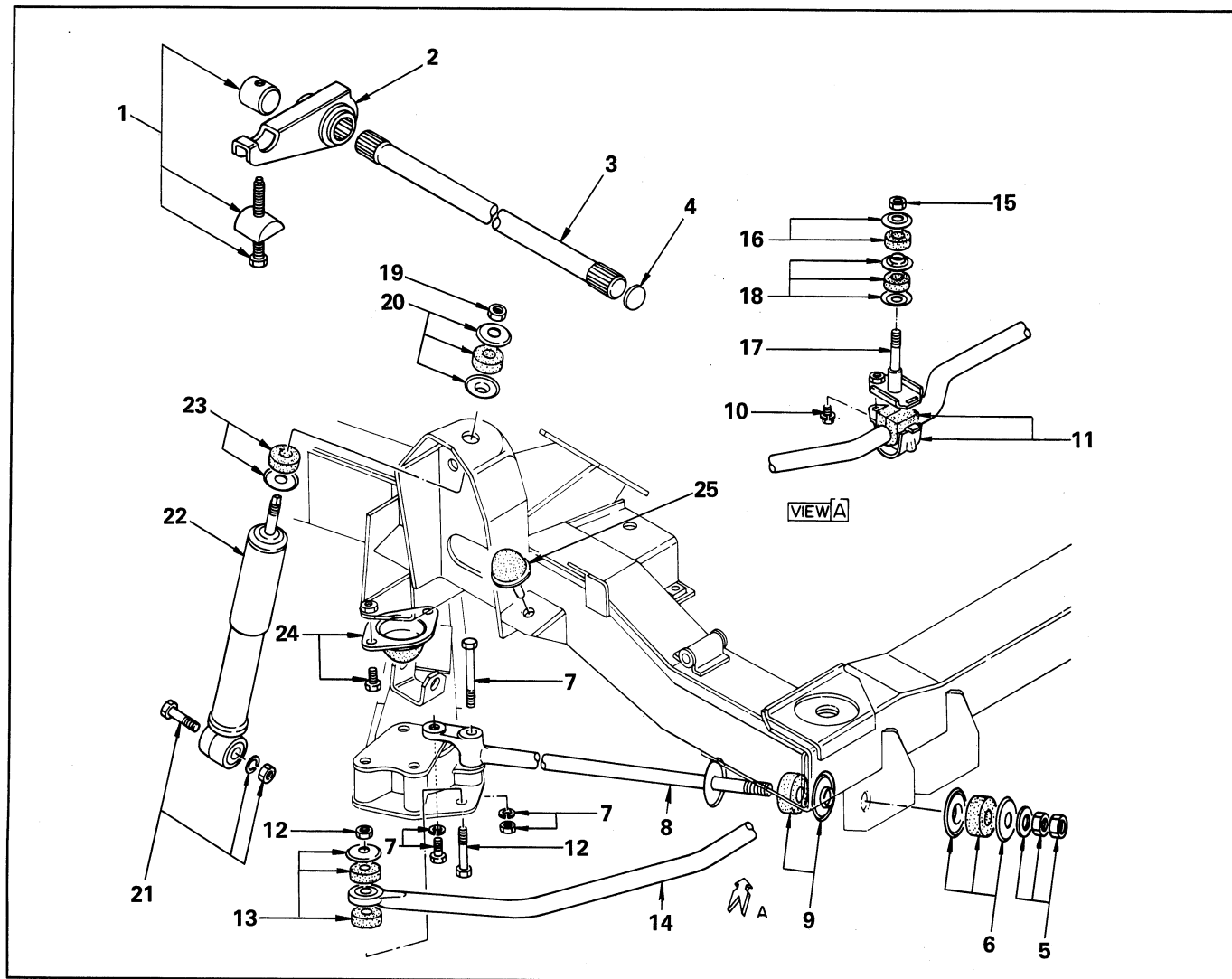
kg-m (ft.lbs.)



TORSION BAR, STRUT BAR, STABILIZER BAR AND SHOCK ABSORBER



DISASSEMBLY



Disassembly Steps

Torsion bar

- ▲ 1. Adjust bolt and seat
- ▲ 2. Height control arm
- ▲ 3. Torsion bar
- 4. Rubber seat

Strut bar

- 5. Nut and washer
- 6. Rubber bushing and washer
- 7. Bolt, nut, and washer
- 8. Strut bar
- 9. Rubber bushing and washer

Stabilizer bar

- 10. Bolt
- 11. Bracket and rubber bushing
- 12. Bolt, nut, and washer
- 13. Rubber bushing and washer
- 14. Stabilizer bar
- 15. Nut
- 16. Rubber bushing and washer
- 17. Bracket
- 18. Rubber bushing and washer

Shock absorber

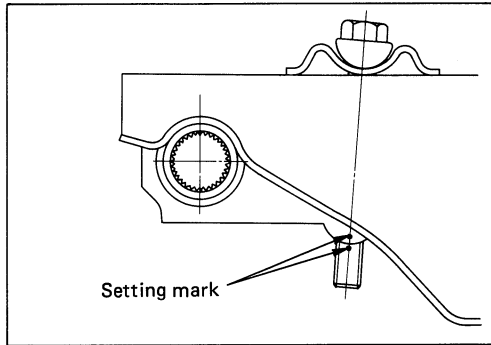
- 19. Nut
- 20. Rubber bushing and washer
- 21. Bolt, nut, and washer
- 22. Shock absorber
- 23. Rubber bushing and washer
- 24. Lower control arm bumper
- 25. Upper control arm



Important operations

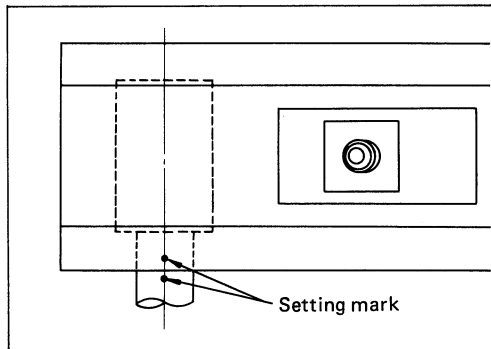
1. Adjust bolt

Apply the setting marks to the adjust bolt and height control arm.



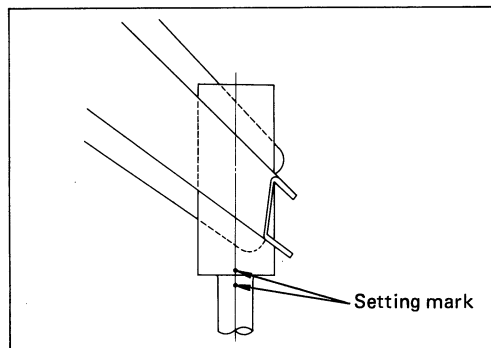
2. Height control arm

Apply the setting marks to the height control arm and torsion bar.



3. Torsion bar

Apply the setting marks to the torsion bar and lower control arm.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Torsion bar, height control arm
- Strut bar
- Stabilizer bar
- Shock absorber
- Rubber bushing



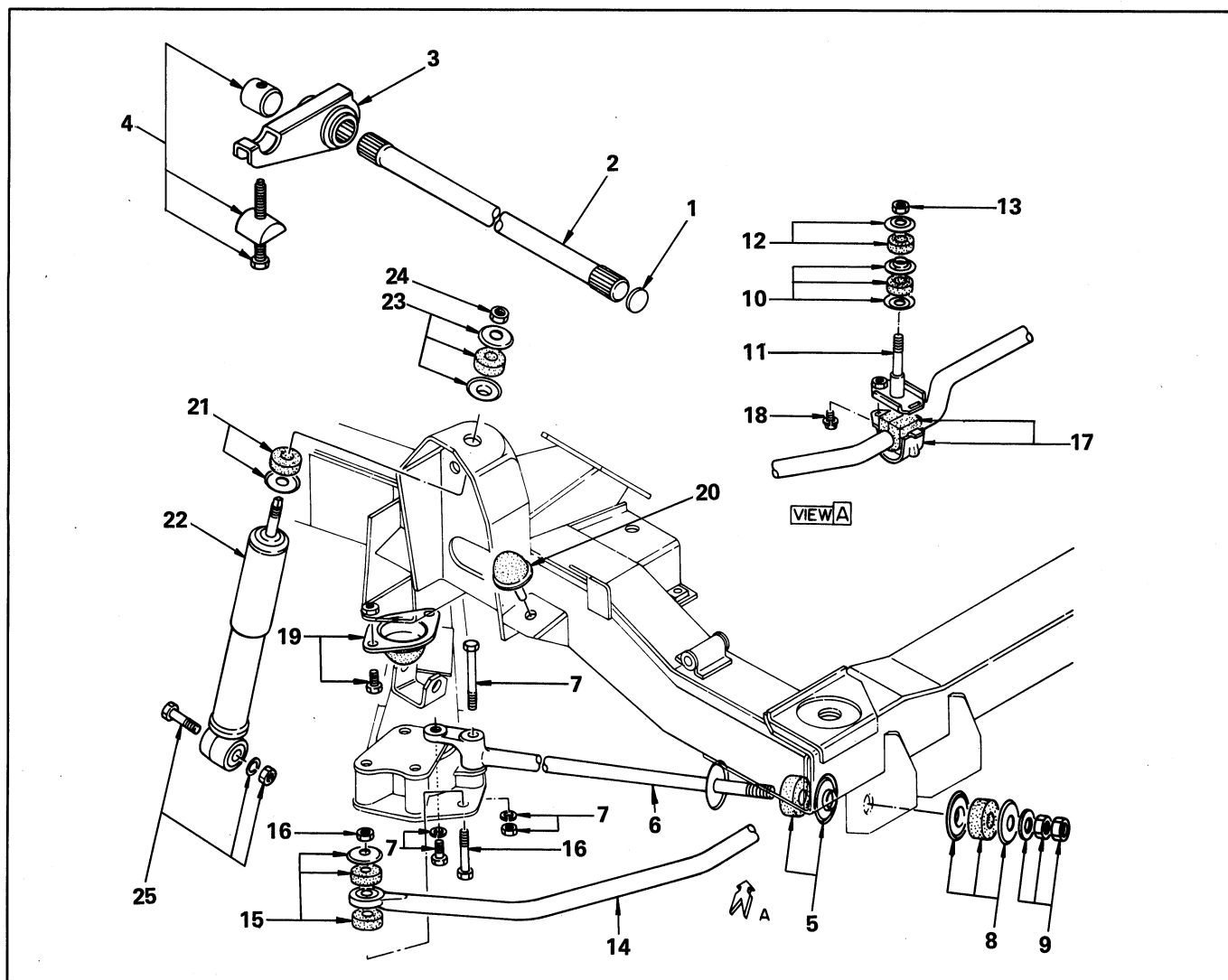
Visual check

Inspect the following parts for wear, damage or other abnormal conditions.

TORSION BAR, STRUT BAR, STABILIZER BAR AND SHOCK ABSORBER



REASSEMBLY



Reassembly Steps

Torsion bar

1. Rubber seat
- ▲ 2. Torsion bar
- ▲ 3. Height control arm
- ▲ 4. Adjust bolt and seat

Strut bar

5. Rubber bushing and washer
6. Strut bar
- ▲ 7. Bolt, nut, and washer
8. Rubber bushing and washer
- ▲ 9. Nut and washer

Stabilizer bar

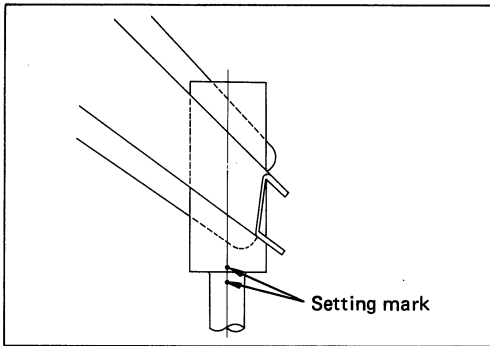
10. Rubber bushing and washer
11. Bracket
12. Rubber bushing and washer
13. Nut
14. Stabilizer bar
15. Rubber bushing and washer
- ▲ 16. Bolt, nut, and washer
17. Bracket
18. Bolt

Shock absorber

19. Lower control arm bumper
20. Upper control arm bumper
21. Rubber bushing and washer
22. Shock absorber
23. Rubber bushing and washer
- ▲ 24. Nut
- ▲ 25. Bolt, nut, and washer



Important operations

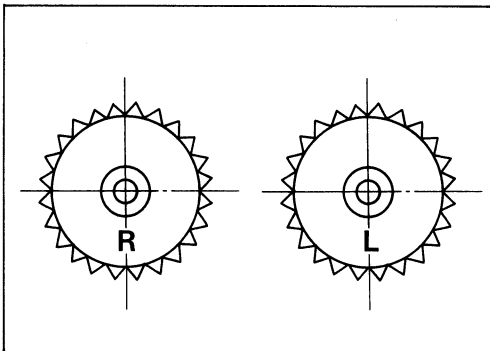


2. Torsion bar

(1) Apply grease to the serrated portions.



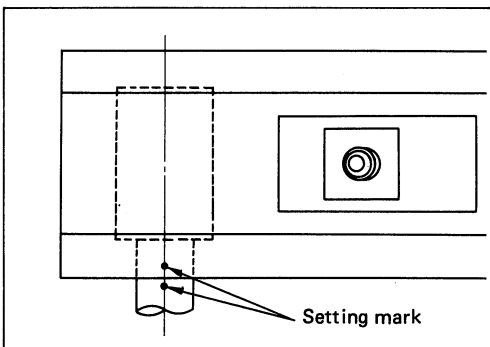
(2) Align the setting marks.



(3) Note the emboss mark on its side face.

R ; Right side

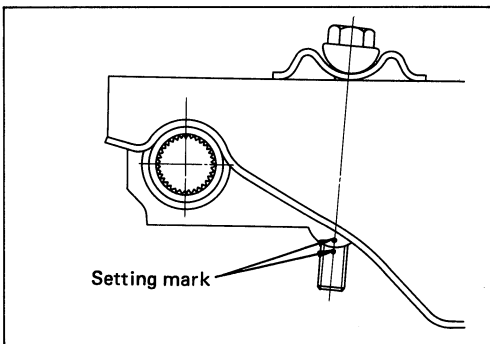
L ; Left side



3. Height control arm

(1) Apply grease to the portion that fits into the bracket.

(2) Align the setting marks.



4. Adjust bolt

(1) Turn in the adjust bolt to location marked during disassembly.

Refer to Section 00 "General information" Servicing for trim height adjustment procedure.



(2) Check the vehicle trim height.



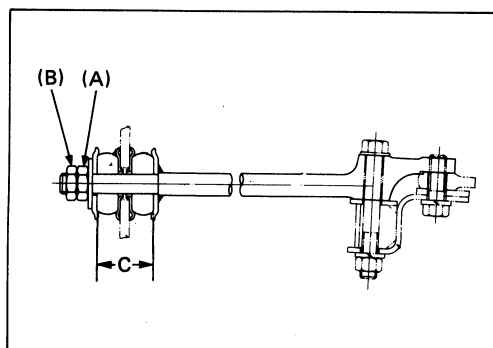
7. Bolt

Torque	kg-m(ft.lbs.)	6.5 — 7.5 (47 — 54)
--------	---------------	---------------------



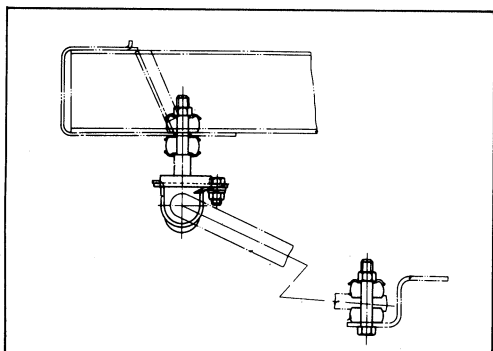
9. Nut and washer

Torque kg-m(ft.lbs.)	Distance (C) mm(in.)
1.8 — 2.2 (1.3 — 16)	36 — 38 (1.42 — 1.50)
7.5 — 8.5 (54 — 61)	



16. Bolt

Torque	kg-m(ft.lbs.)	0.8 — 1.2 (5.7 — 8.7)
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24. Nut

Torque	kg-m(ft.lbs.)	1.8 — 2.2 (13 — 16)
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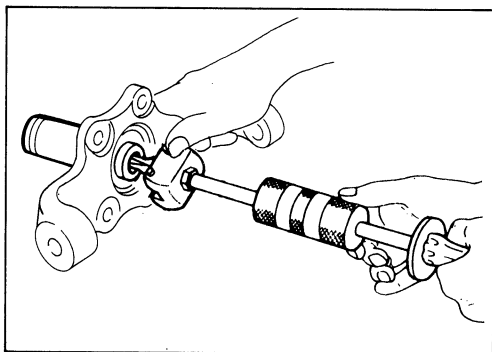


25. Bolt

Torque	kg-m(ft.lbs.)	5.5 — 6.5 (40 — 47)
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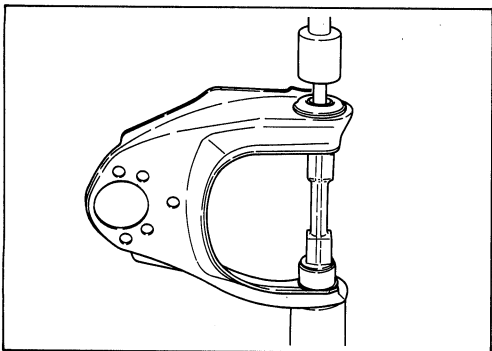


Important operations



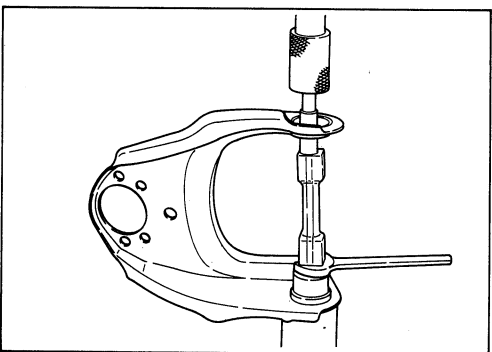
9. Needle bearing

Remover : J-23907



17. Bushing

Remover and installer : J-29755



19. Camber shims

20. Caster shims

Note the positions and number of shims.

24. Lower link assembly

Before removal, remove the torsion bar, strut bar, stabilizer bar and shock absorber.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Knuckle, Knuckle arm
- Needle bearing, oil seal
- Upper link, lower link, bushing
- Upper end, lower end, boot
- Fulcrum pin

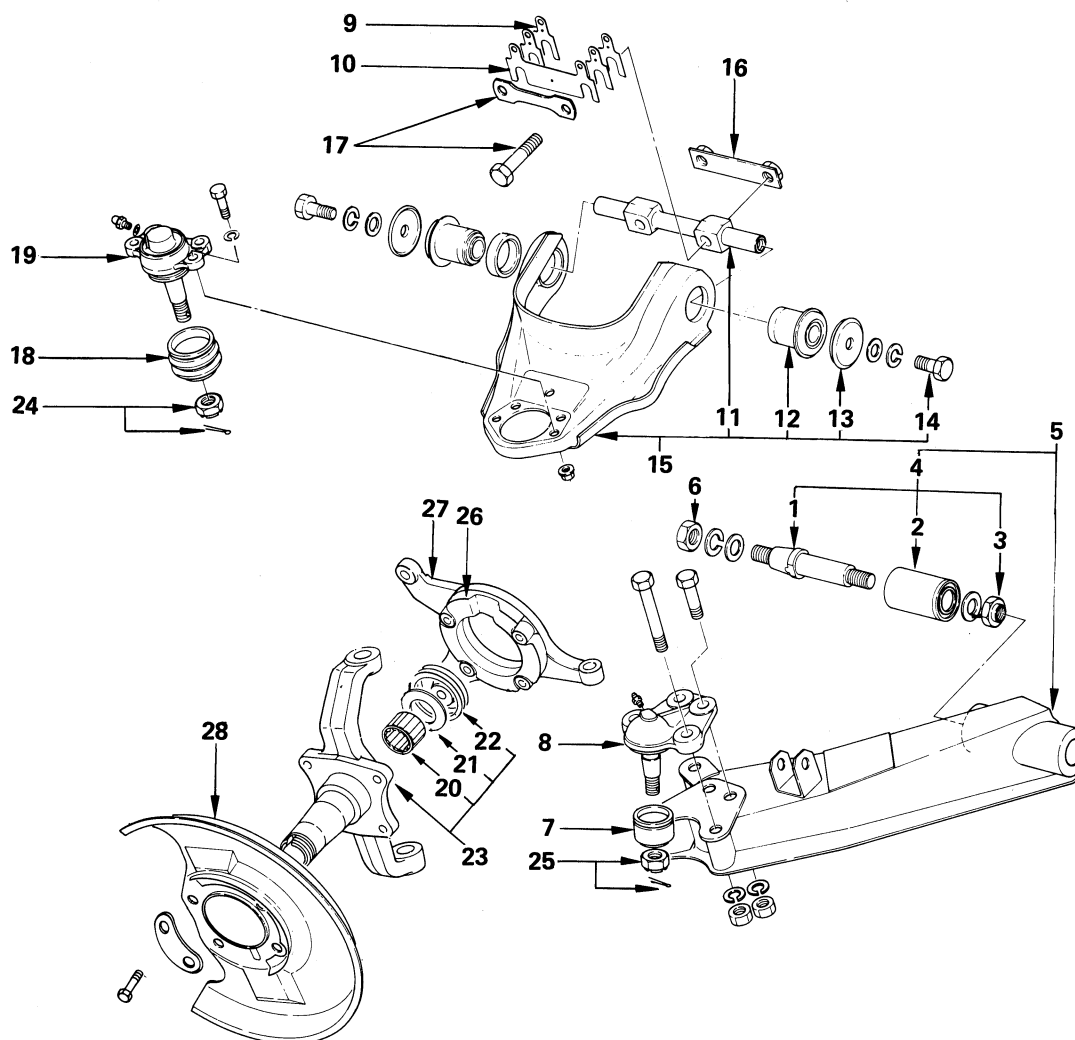


Visual check

Inspect the following parts for wear, damage, or other abnormal conditions.



REASSEMBLY



Reassembly steps

Lower link

1. Fulcrum pin
2. Bushing
3. Nut
4. Bushing and pin
5. Lower link assembly
- ▲ 6. Nut and washer
7. Boot
- ▲ 8. Lower end

Upper link

- ▲ 9. Caster shims
- ▲ 10. Camber shims
- ▲ 11. Fulcrum pin
- ▲ 12. Bushing
13. Plate
- ▲ 14. Bolt and washer
15. Upper link assembly
16. Nut assembly
- ▲ 17. Bolt and plate
18. Boot
- ▲ 19. Upper end

Knuckle

- ▲ 20. Needle bearing
21. Washer
- ▲ 22. Oil seal
23. Knuckle
- ▲ 24. Nut and cotter pin
- ▲ 25. Nut and cotter pin
26. Dust shield
27. Knuckle arm
28. Back plate



Important operations



6. Nut

Torque	kg-m(ft.lbs.)	13 — 14 (94 — 101)
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8. Lower end

Bolt torque	kg-m(ft.lbs.)	6.5 — 7.5 (47 — 54)
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9. Caster shims

Adjust the caster angle.

Refer to section 00 "General information" Servicing for caster angle adjustment procedure.



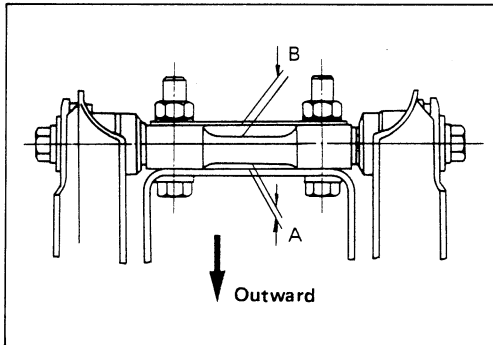
10. Camber shims

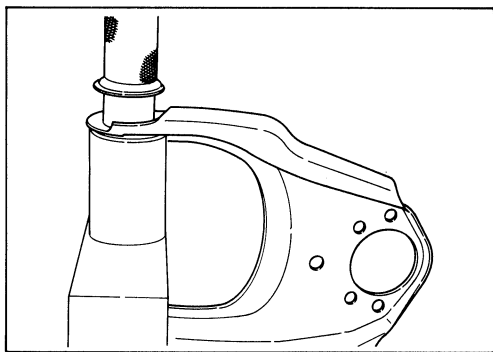
Adjust the camber angle.

Refer to section 00 "General information" Servicing for camber angle adjustment procedure.

11. Flucrum pin

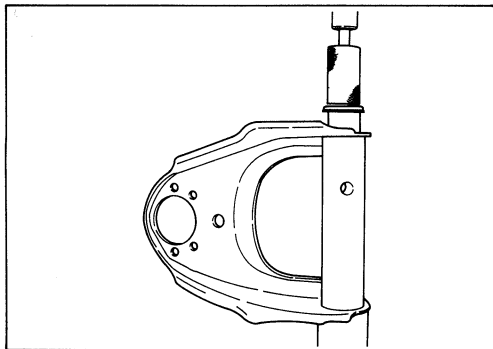
Install the smaller clearance A corner outside and larger clearance B inside of vehicle.





12. Bushing

Remover and installer : J-29755



14. Bolt

Torque	kg-m(ft.lbs.)	11 — 13 (80 — 94)
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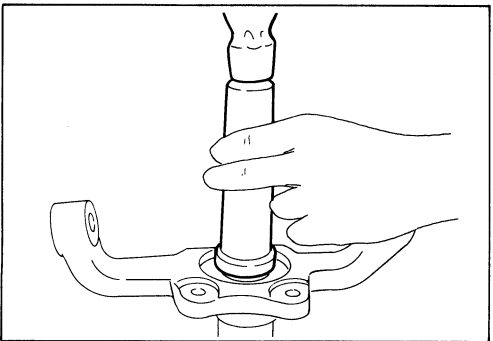
17. Bolt and plate

Torque	kg-m(ft.lbs.)	10 — 11 (72 — 80)
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19. Upper end

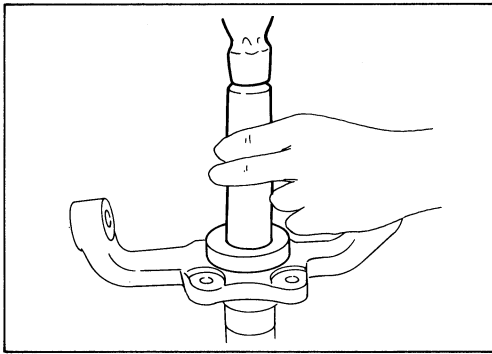
Bolt torque	kg-m(ft.lbs.)	2.3 — 2.8 (17 — 20)
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20. Needle bearing

Installer : J-29019

Grip : J-8092

**22. Oil seal**

Installer : J-33161

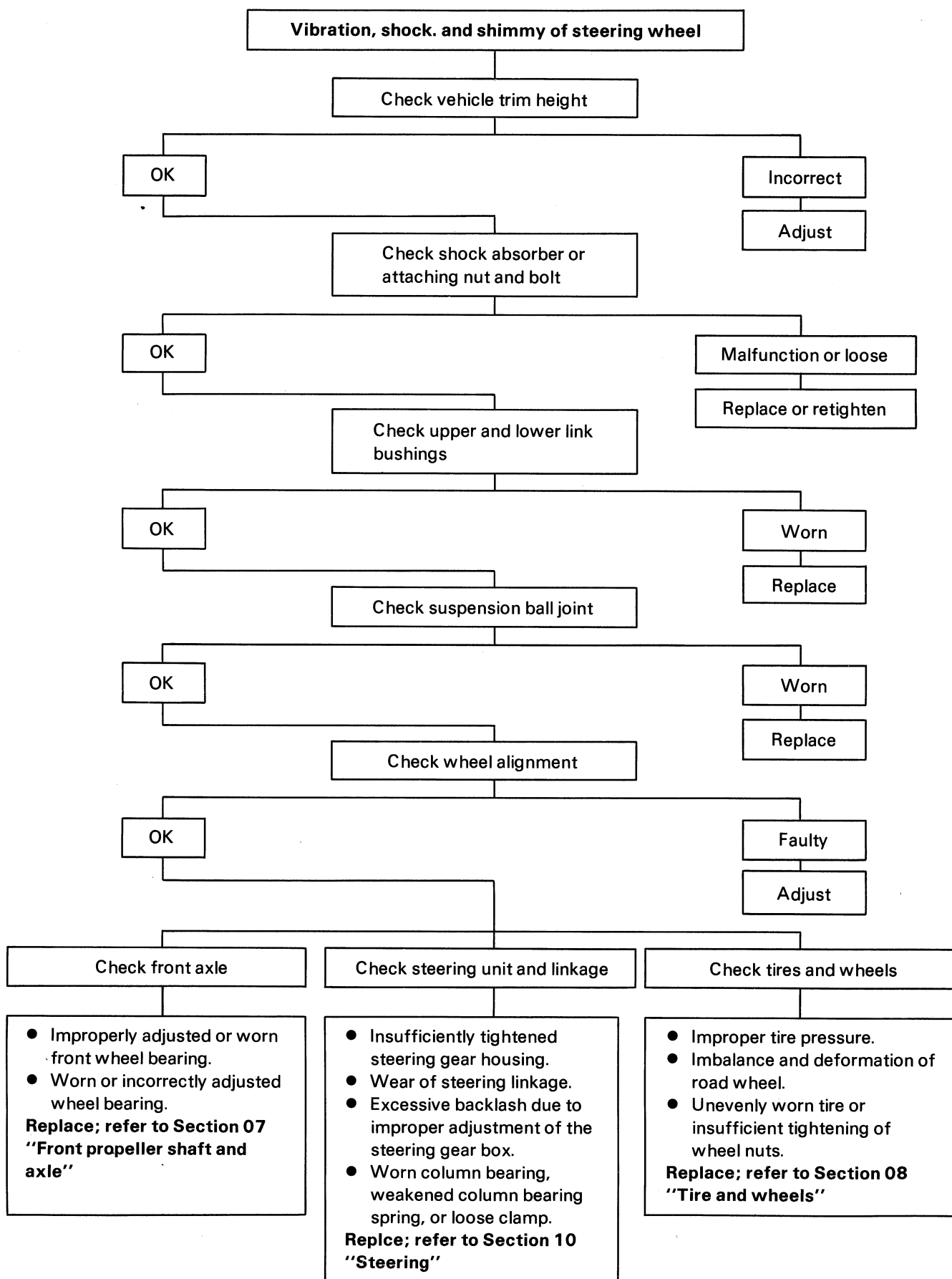
Grip : J-8092

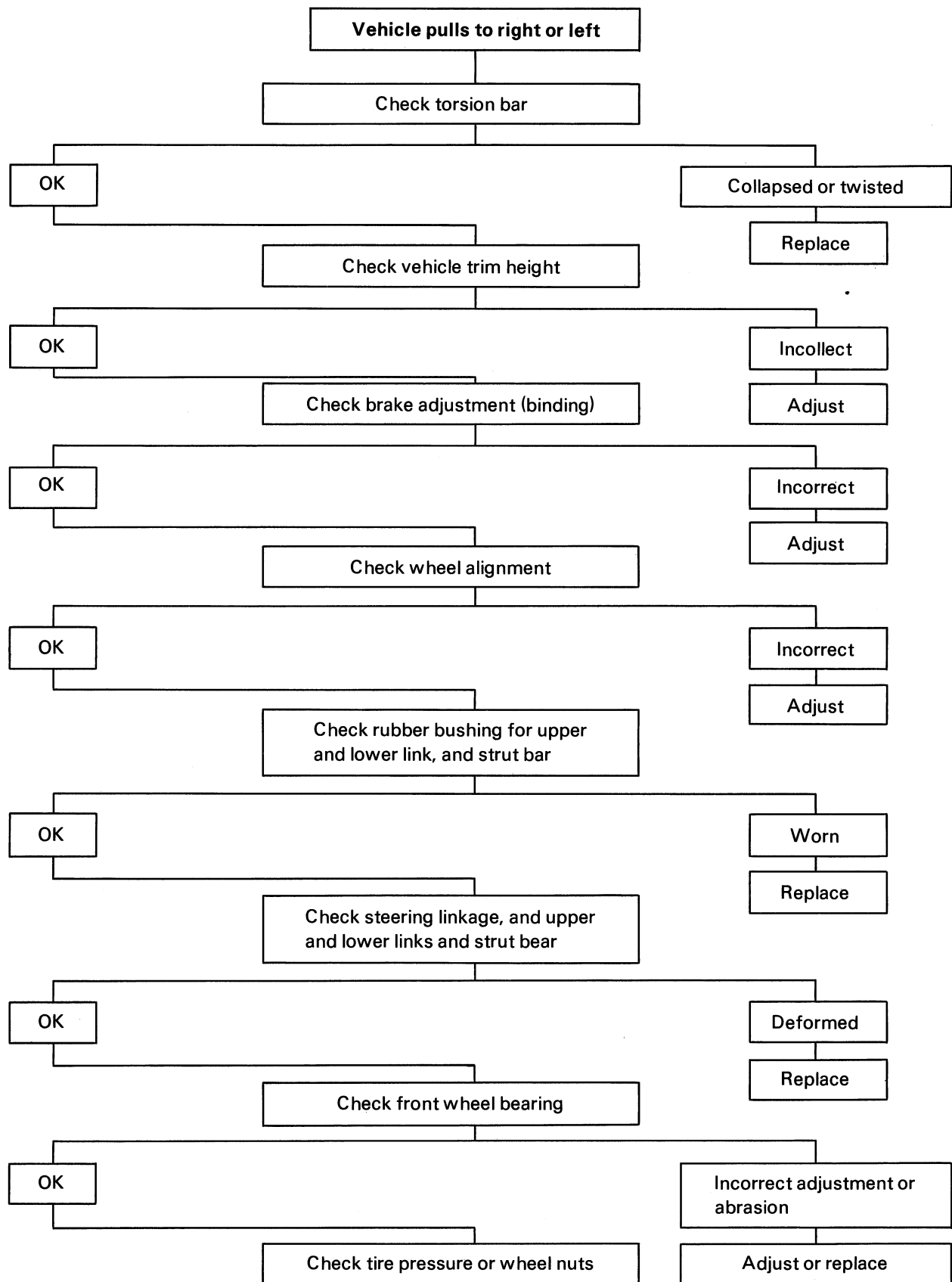
- Insert the thrust washer into the knuckle.
- After fitting the oil seal to the setting tool; installer, drive it to the knuckle using a hammer or bench press until the tool front face contacts with the thrust washer.

**24. Nut****25. Nut**

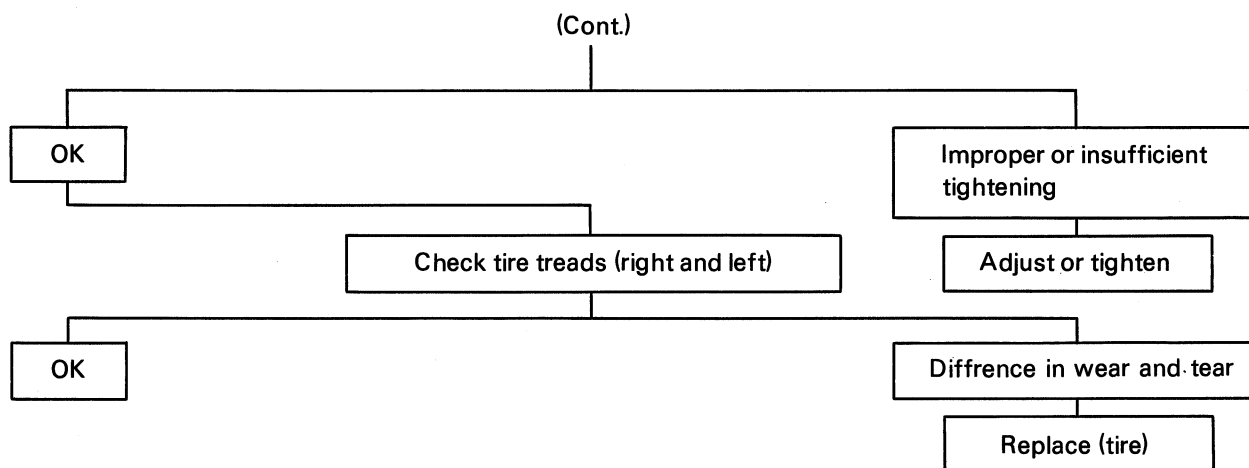
Torque		kg-m(ft.lbs.)	10 - 11 (72 - 80)
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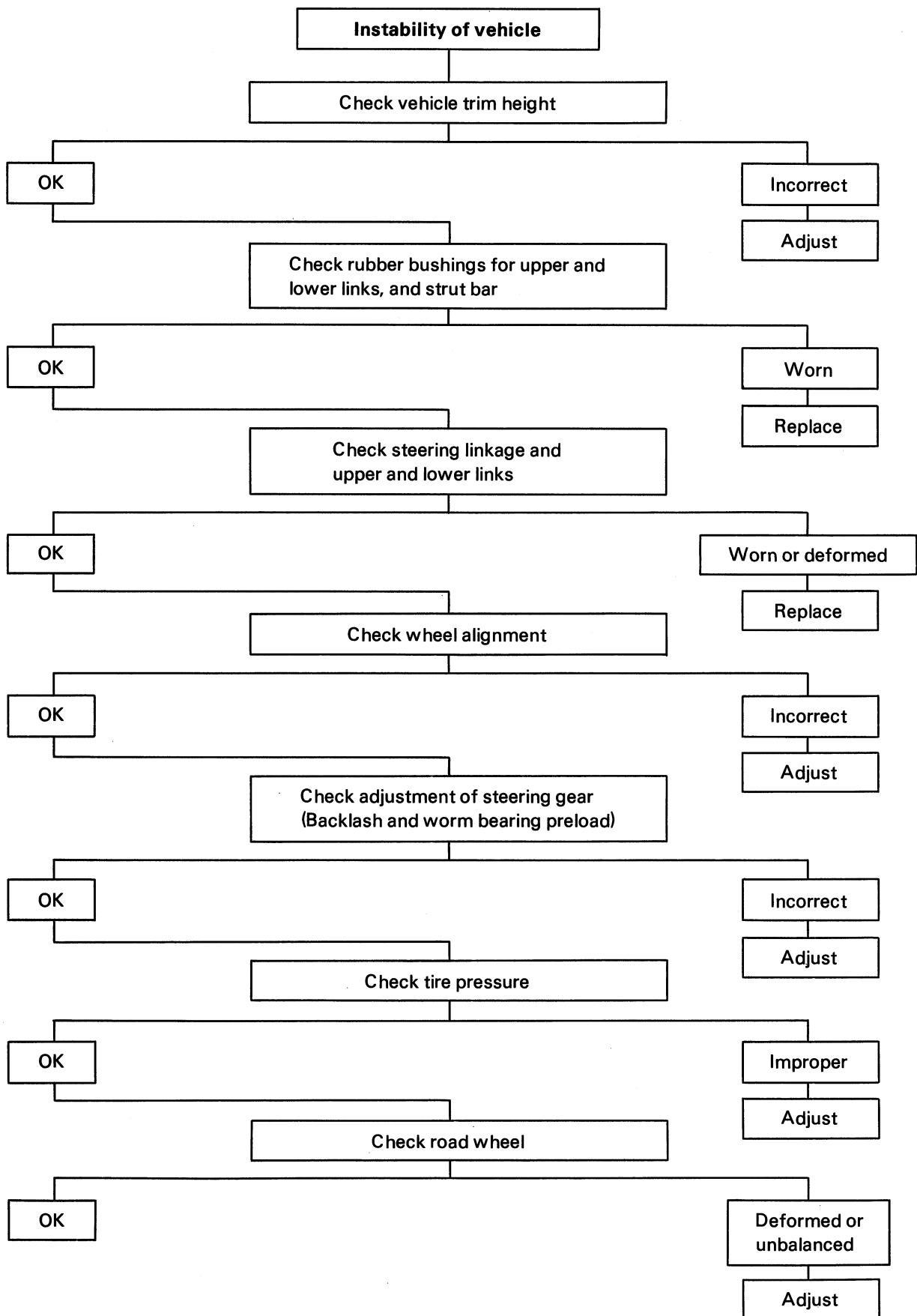
DIAGNOSIS

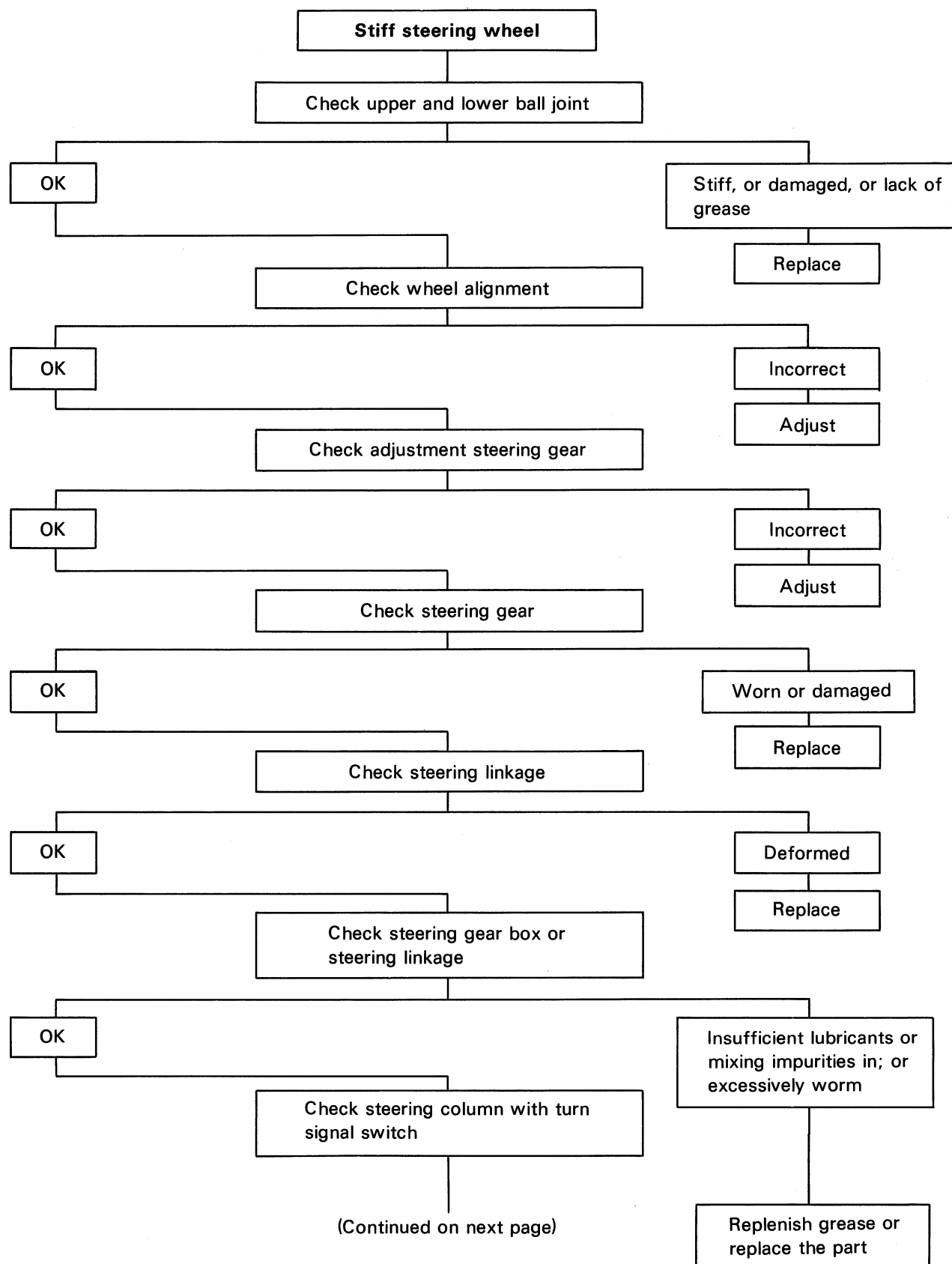


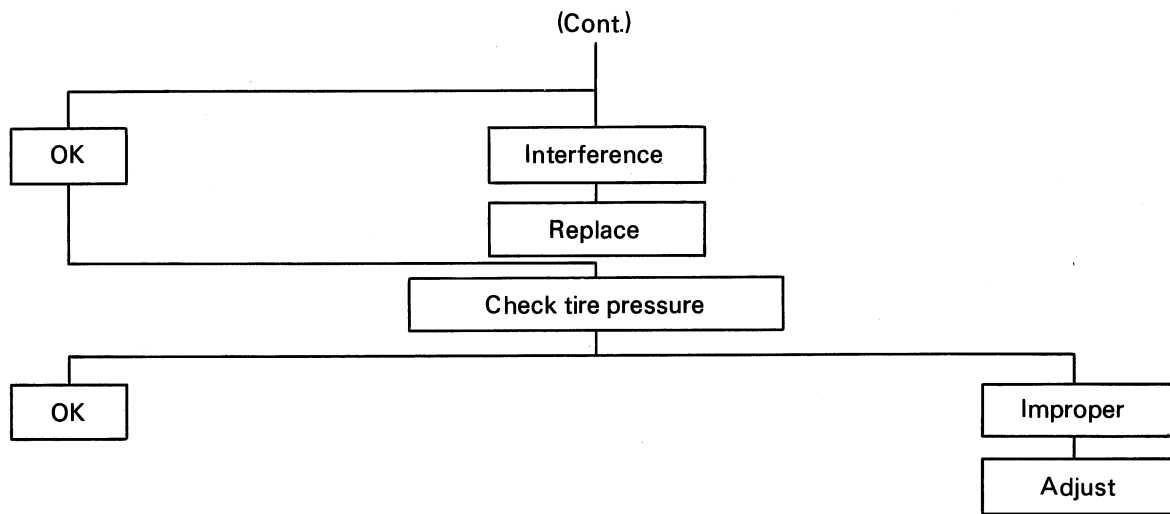


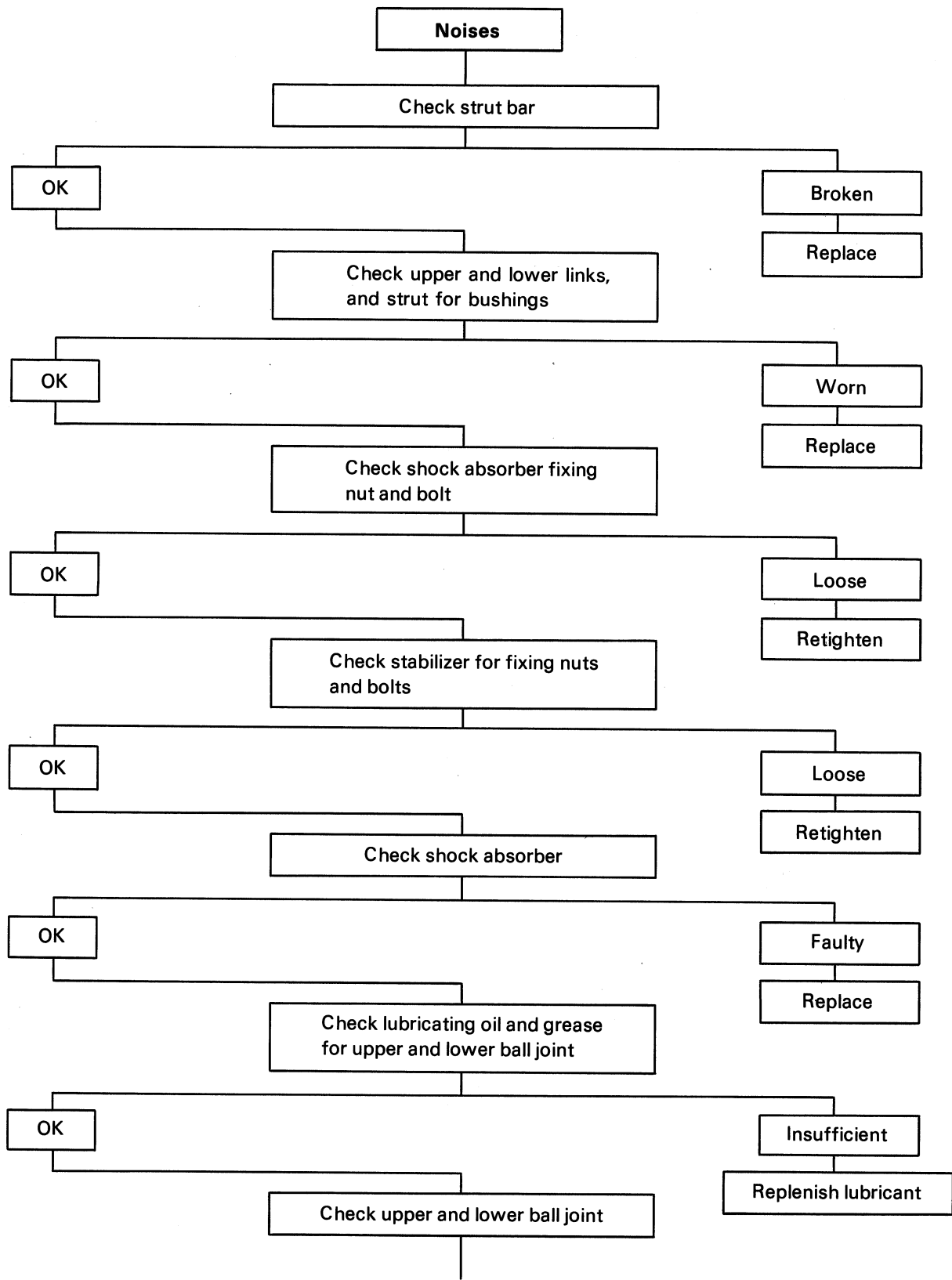
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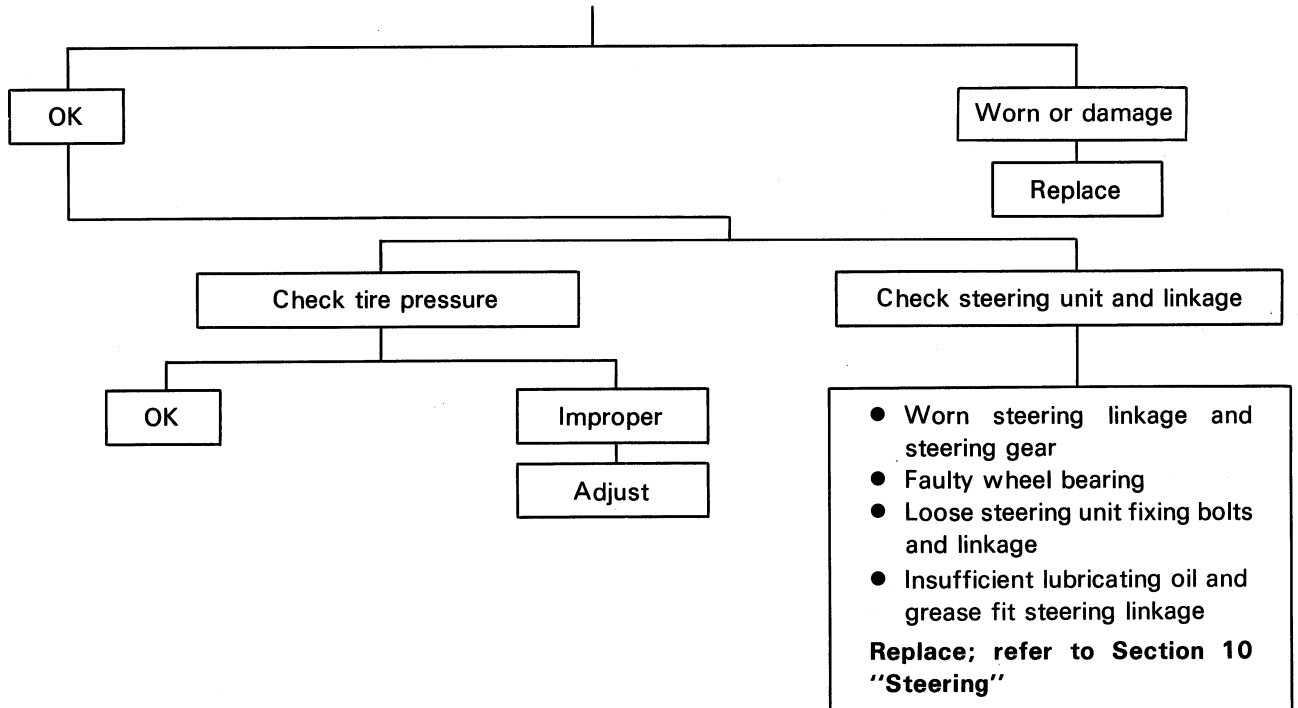


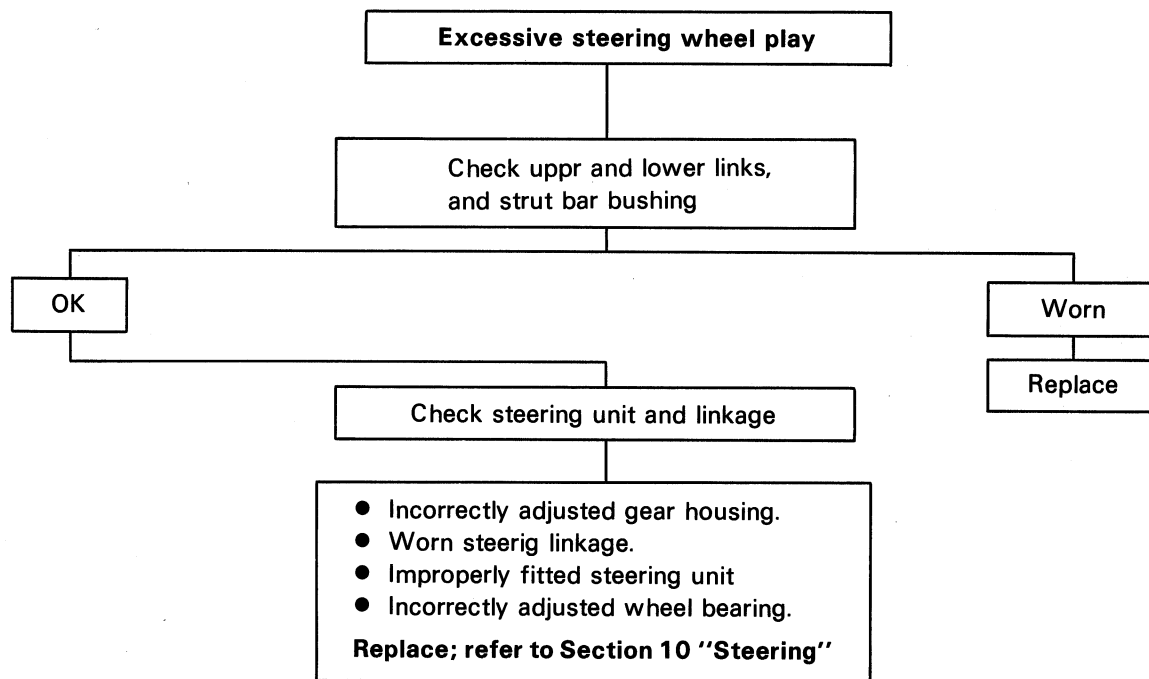


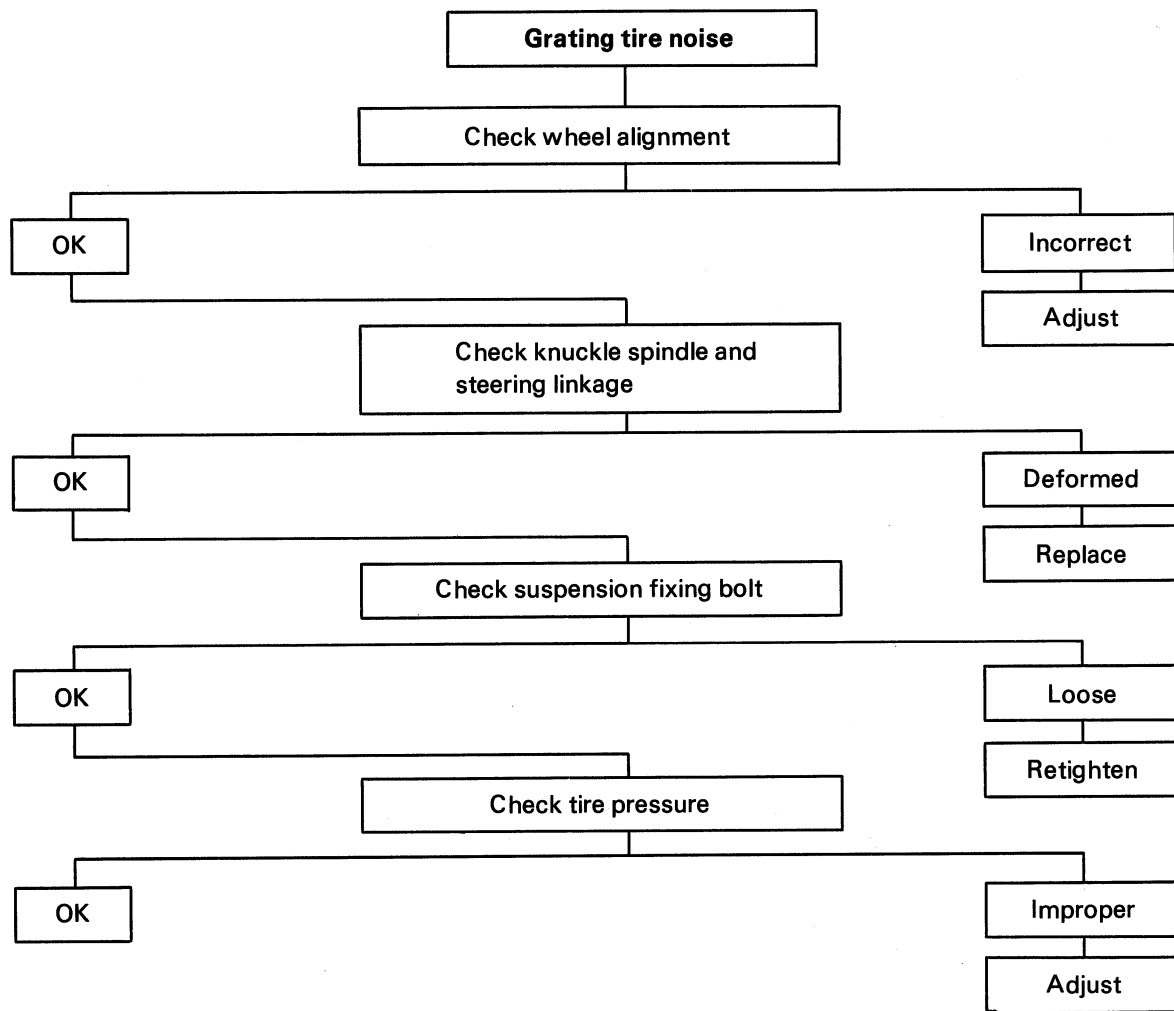


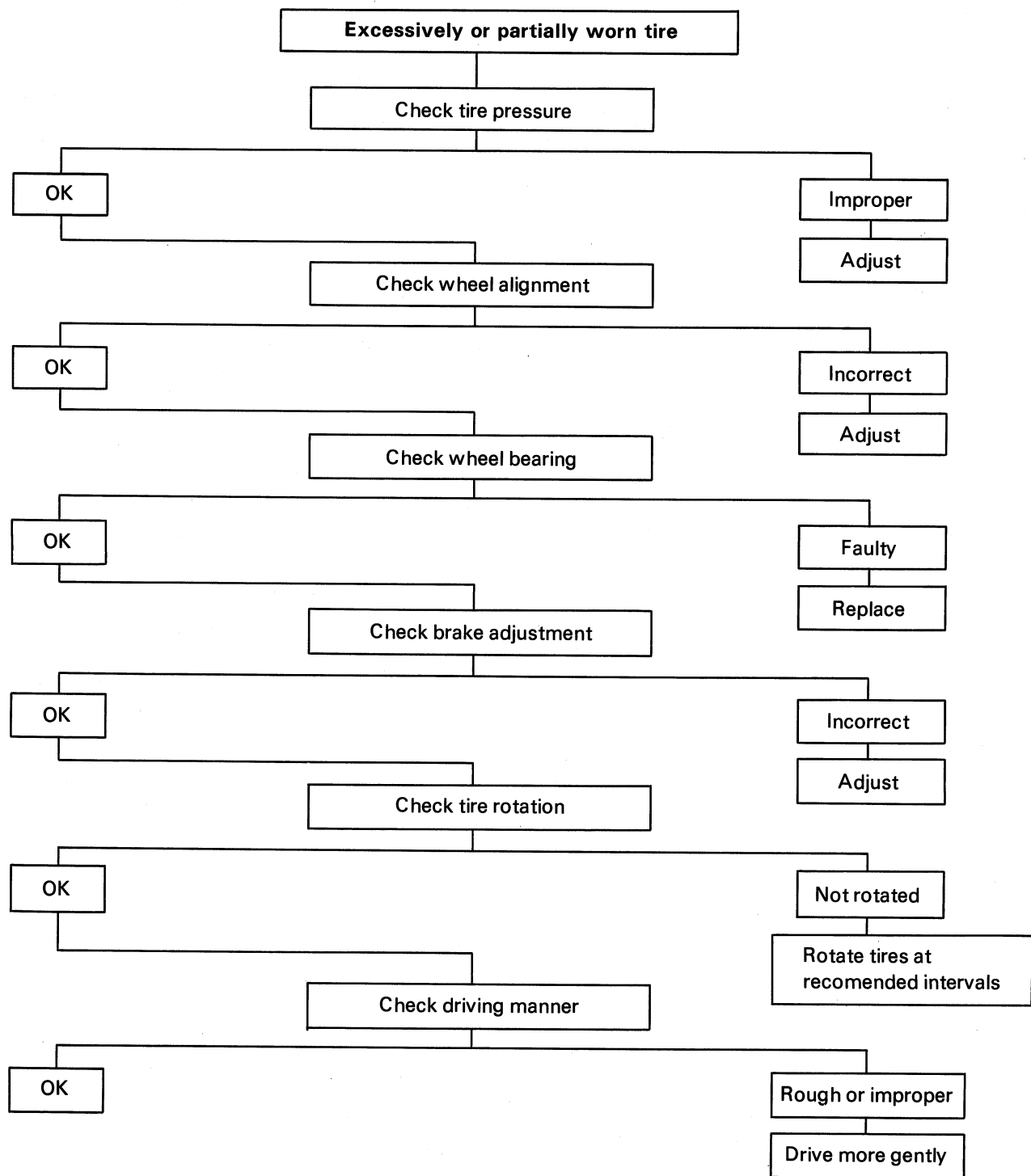
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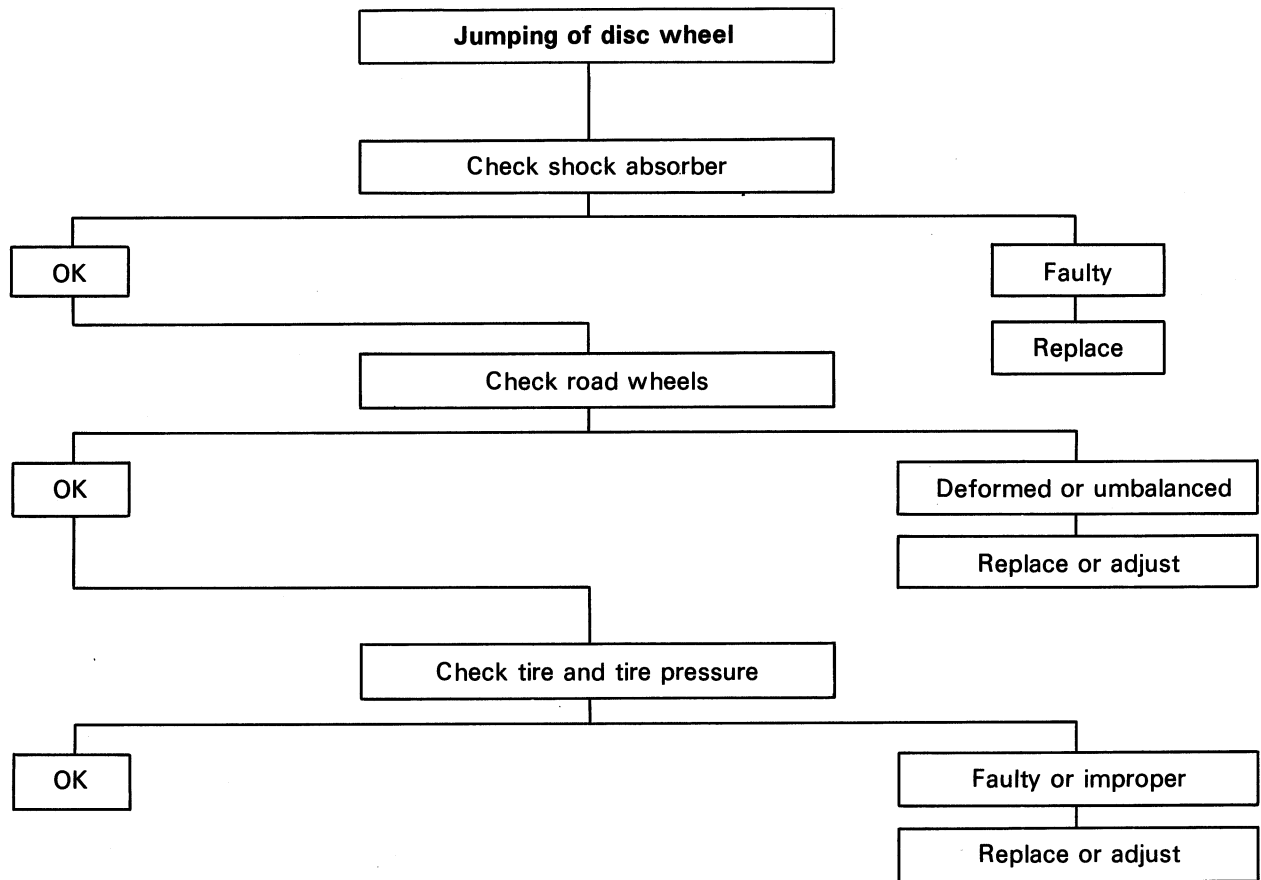
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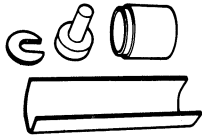
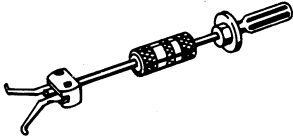
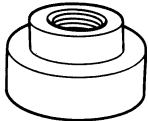
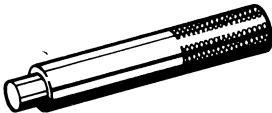








SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-29755	Upper link bushing Remover & installer
		J-23907	Needle bearing : knuckle Remover
		J-29019	Needle bearing : Knuckle Installer
		J-33161	Oil seal : knuckle Installer
		J-8092	Grip

SECTION 07A

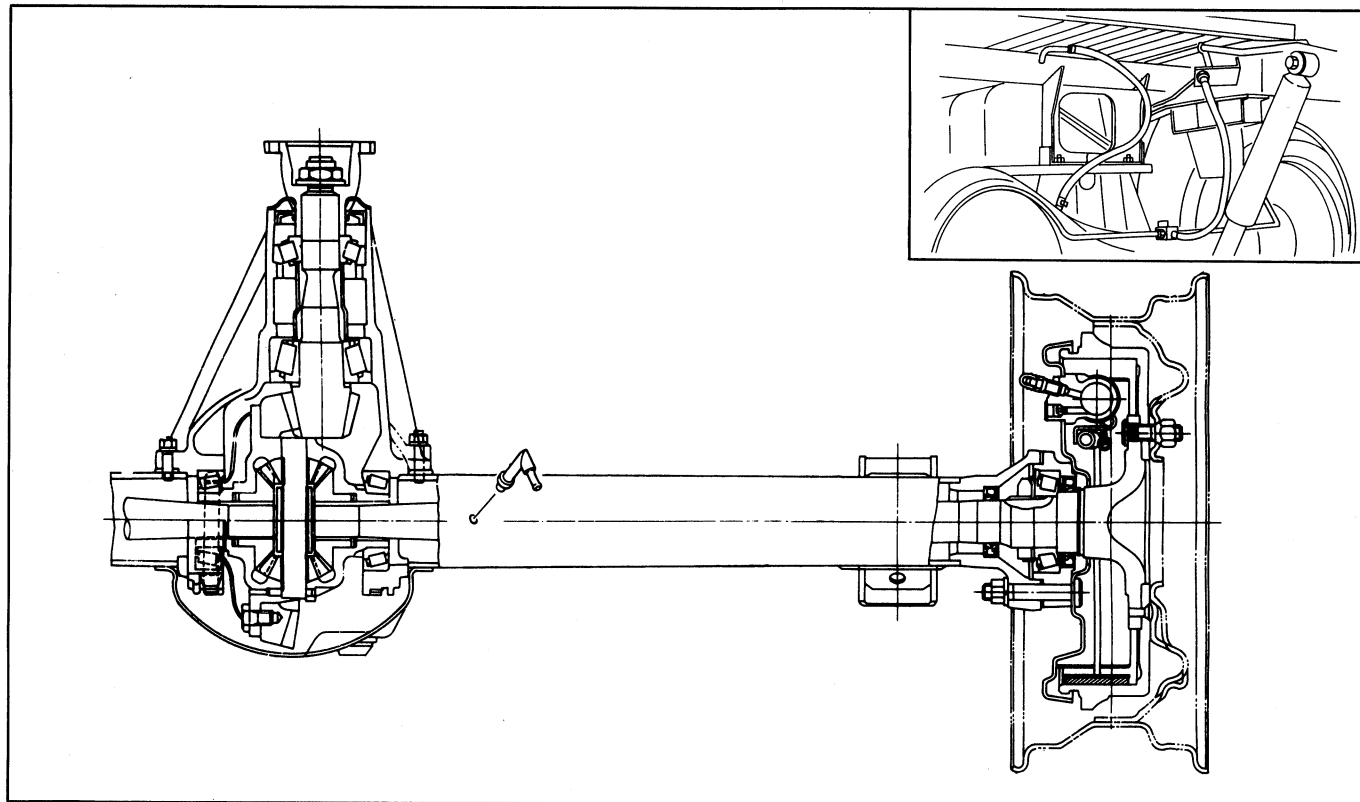
REAR AXLE AND REAR PROPELLER SHAFT

INDEX

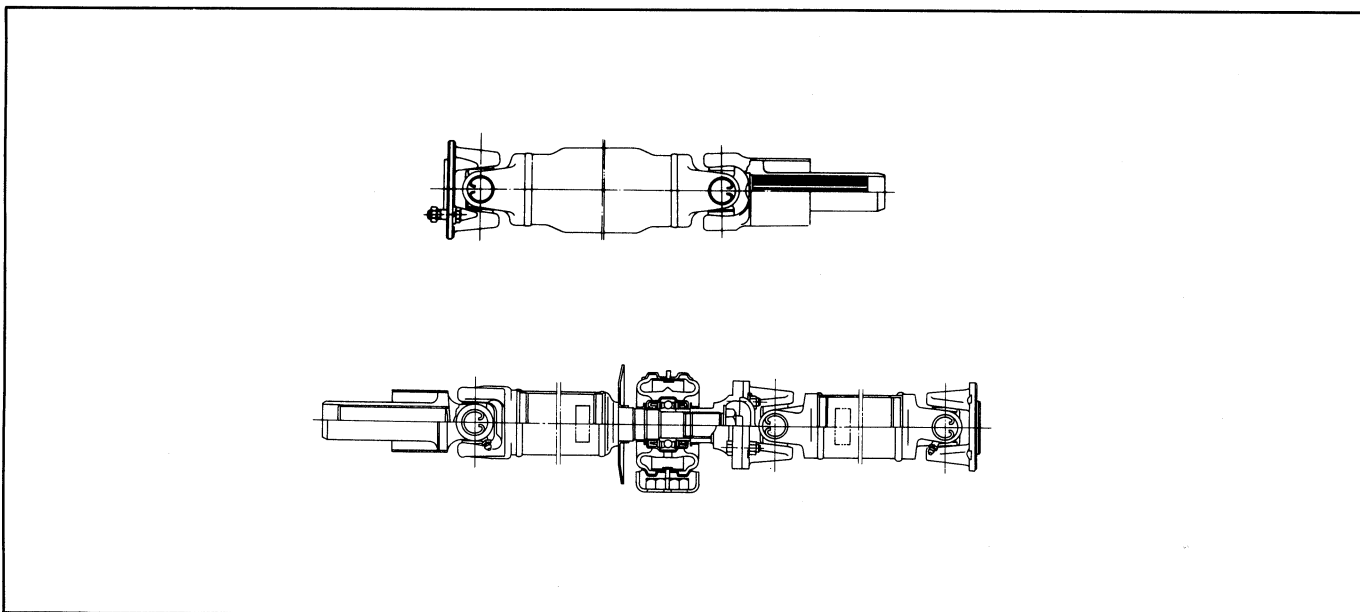
CONTENTS	PAGE
General description	07A— 2
Main data and specifications	07A— 3
Major parts ; fixing nuts and bolts	07A— 4
Axle shaft	07A— 6
Differential	07A—15
Propeller shaft	07A—36
Diagnosis	07A—45
Special tools	07A—49

GENERAL DESCRIPTION

Rear axle & Differential



Rear propeller shaft



MAIN DATA AND SPECIFICATIONS

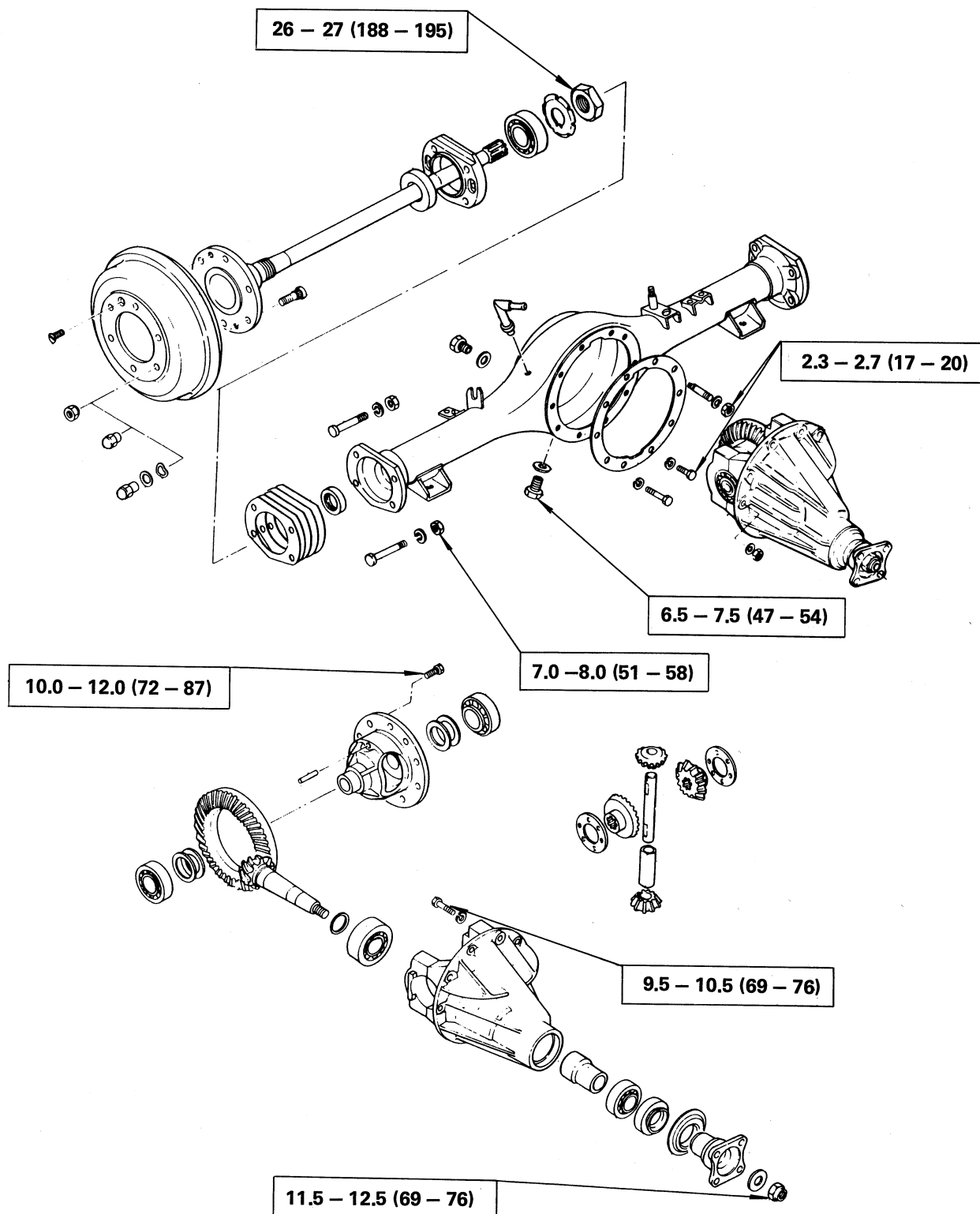
Items	Data
REAR AXLE	
Type	Banjo, Semi-floating
Axle capacity	1200
Tread	1345
Axle tube	
Outside diameter	69.0 (2.72)
Thickness	4.0 (0.16)
Gear type	Hypoid
Final gear ratio	4.555
Ring gear	
Pitch diameter	194 (7.64)
Drive pinion	
Backlash	0.13 — 0.18 (0.005 — 0.007)
Offset to ring gear	31.75 (1.25)
Differential type	Two pinion
Axle shaft	
Type	Integral shaft and drive flange
Oil capacity	1.5 (0.4)
Weight	80 (176.4)

Items	Data
RR. PROPELLER SHAFTS	
Outside diameter	63.5 (2.5)
Inside diameter	60.3 (2.37)
Length — 1st	583.5 (22.97)
2nd	938.0 (36.93)
Spline outside dia.	29.9 (1.18)
Universal joint type	Cardan type

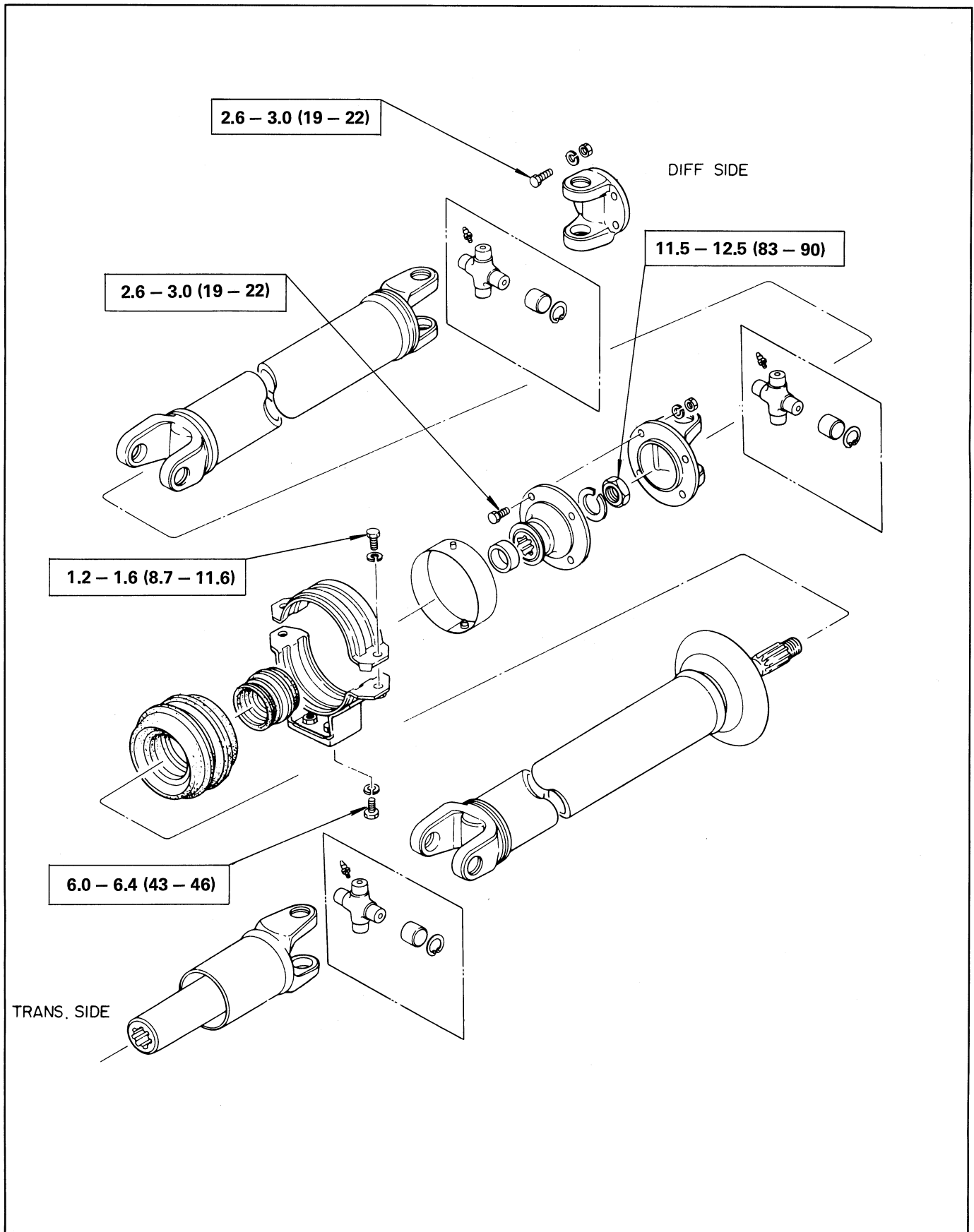
MAJOR PARTS ; FIXING NUTS AND BOLTS

REAR AXLE AND DIFFERENTIAL

kg-m(ft.lbs.)



REAR PROPELLER SHAFT

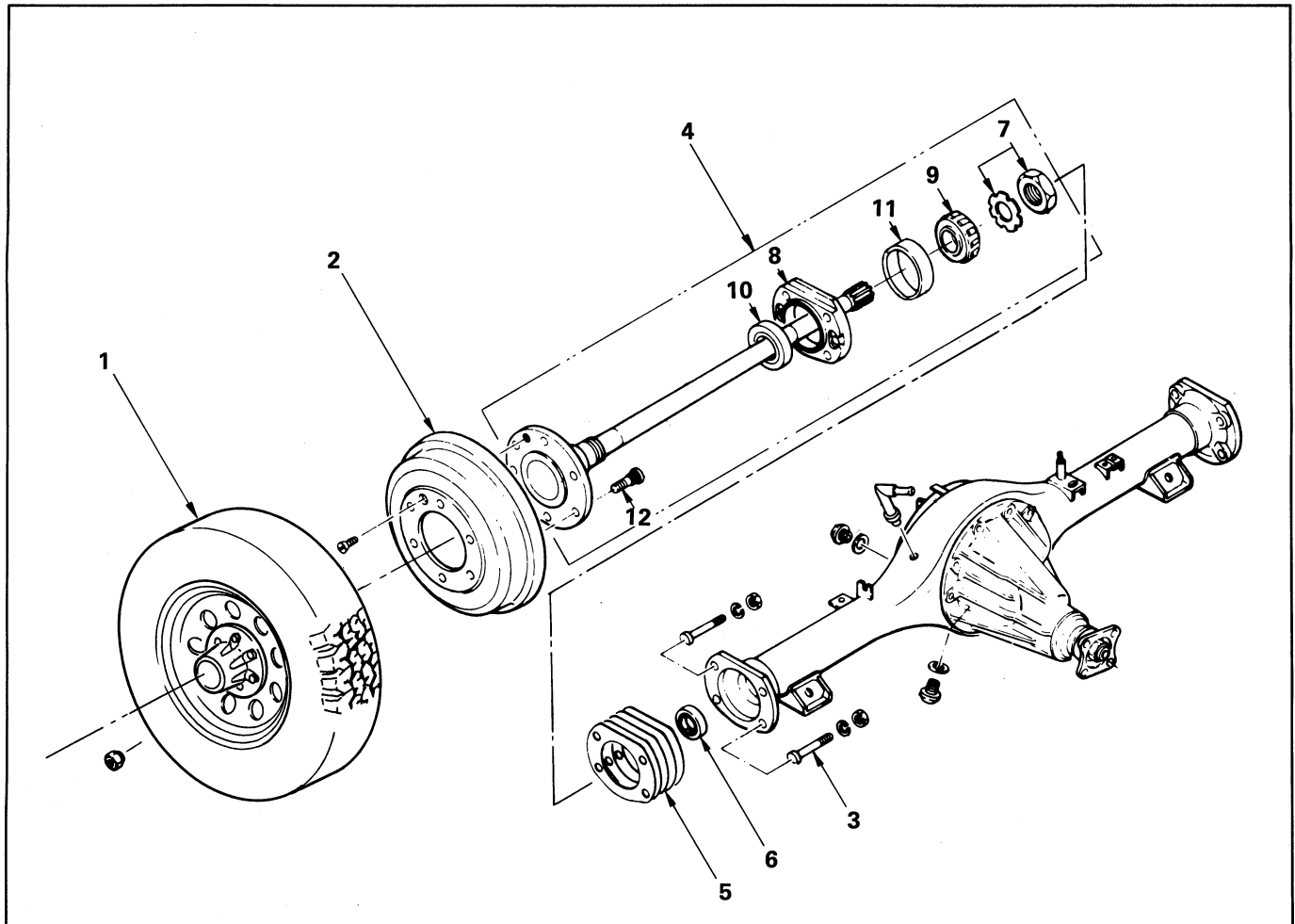


AXLE SHAFT



DISASSEMBLY

1. Refer to Section 08 "TIRE & WHEEL" for road wheel Disassembly procedure.
2. Refer to Section 09 "BRAKE" for rear brake removal procedure.



Disassembly steps

- | | |
|--------------------------|-----------------------------|
| ▲ 1. Wheel and tire | ▲ 7. Bearing nut and washer |
| ▲ 2. Brake drum | ▲ 8. Bearing holder |
| ▲ 3. Nuts and bolts | ▲ 9. Bearing |
| ▲ 4. Axle shaft assembly | 10. Oil seal |
| 5. Shim | ▲ 11. Bearing outer race |
| 6. Oil seal | ▲ 12. Wheel pin |

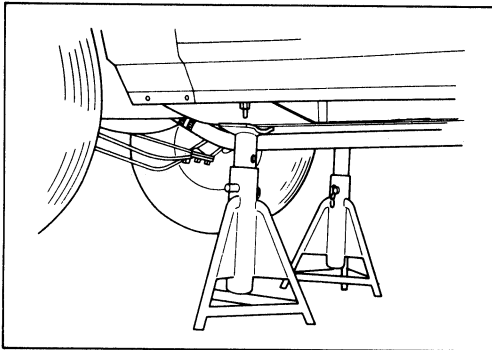


Important operations

1. Wheel and tire

Raise vehicle to the working level.

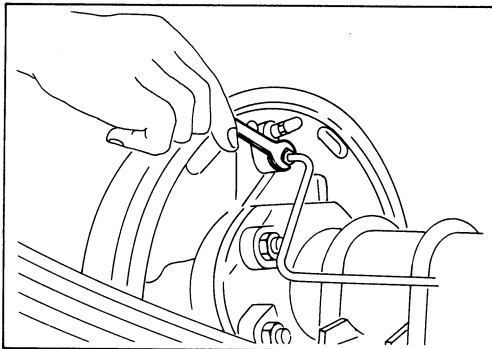
Support the axle assembly with the proper jack and chassis stands.



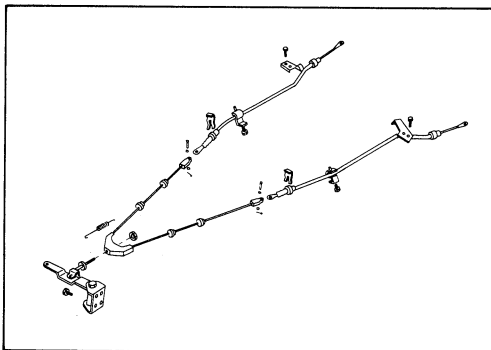
2. Brake drum

Before disassembling the axle shaft assembly, disconnect the following parts.

- (1) Disconnect the brake pipe from the brake wheel cylinder on the back plate.

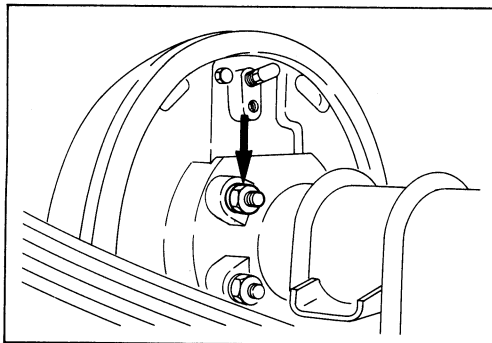


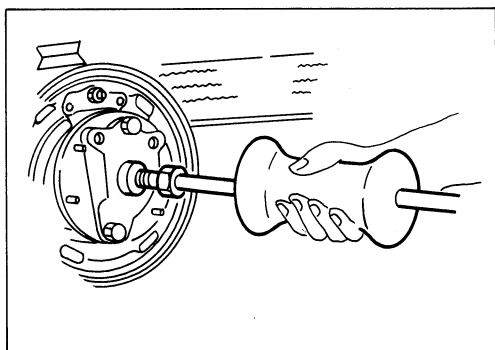
- (2) Disconnect the parking brake cable.



3. Bolt and nut

Remove the four nuts from the bearing holder fixing-bolts.

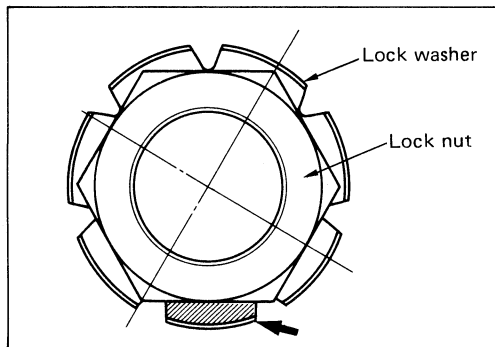




4. Axle shaft assembly

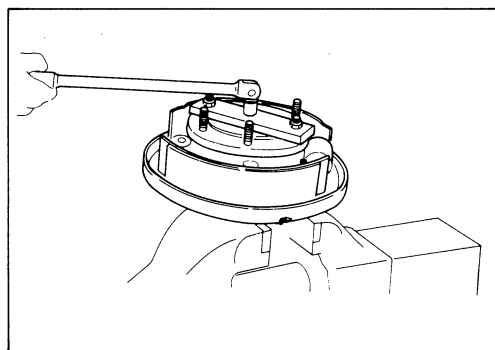
Puller : J-21579

Slide hammer : J-2619-01



7. Bearing nut and washer

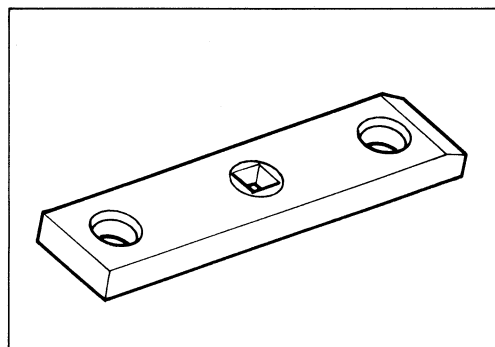
(1) Flatten the locking tab on the convex lock washer.



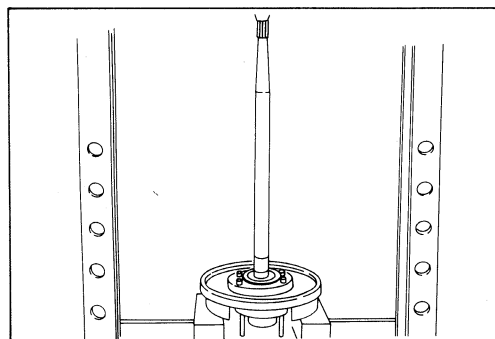
(2) Clamp the axle shaft into the vise, with the vise jaws gripping the lock nut.
Do not overtighten the vise.

(3) Attach the special tool to the flange studs, lock it into position with the two wheel nuts, and the the axle shaft loose from the lock nut.

Remover and installer : J-24246



NOTICE: Because of the high torque on the locknut, it is sometimes necessary to have help when performing this operation.

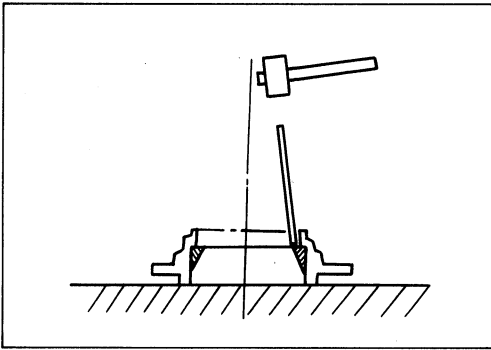


8. Bearing holder

9. Bearing

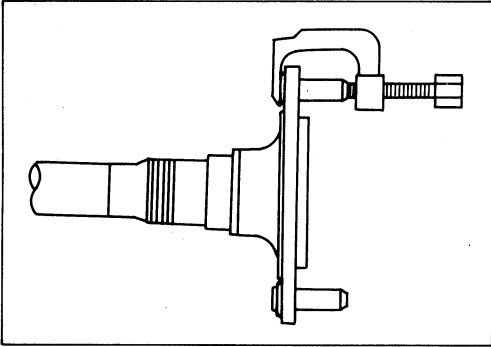
Remove the bearing holder and bearing from the axle shaft by means of a press.

NOTICE: Only a slight amount of pressure from the press is required to separate the bearing from the shaft. Be sure to support the backing plate solidly, and to hold onto the axle shaft to prevent it from falling to the floor.



11. Bearing outer race

Drive off the bearing outer race using a brass drift.



12. Wheel pin

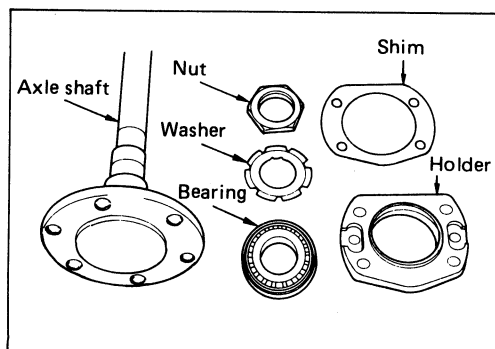
Remove the wheel pins from the axle shaft flange.

Remover : J-6627-A



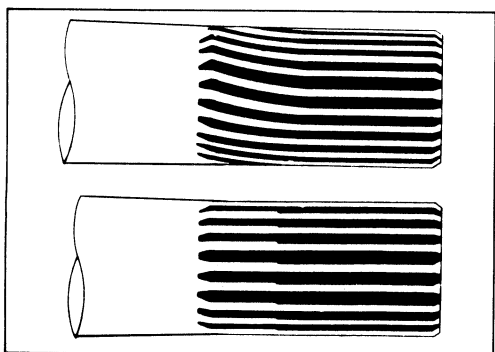
INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



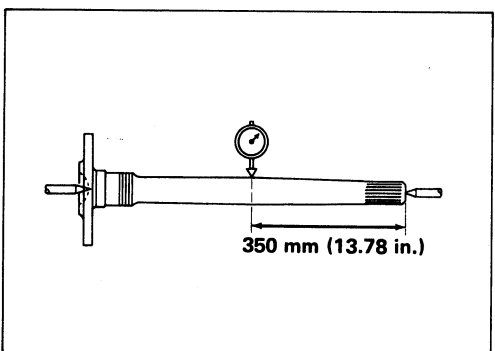
Visual check

Inspect the following parts for wear, damage, or other abnormal conditions.



Axle shaft

When checking the axle shaft, pay special attention to the splined portions and replace the shaft if distortion or step wear is noticeable. Correct slight step wear with a pencil grinder.



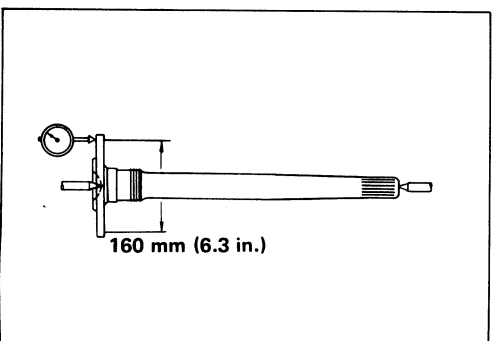
Axle shaft run-out

Check the shafts for bending with the use of a dial indicator in contact with the shaft. Rotate the shaft slowly and observe the dial indicator.

Limit	mm(in.)	1.0 (0.039)
-------	---------	-------------



NOTICE: NEVER use heat to correct bending.



Axle shaft flange run-out

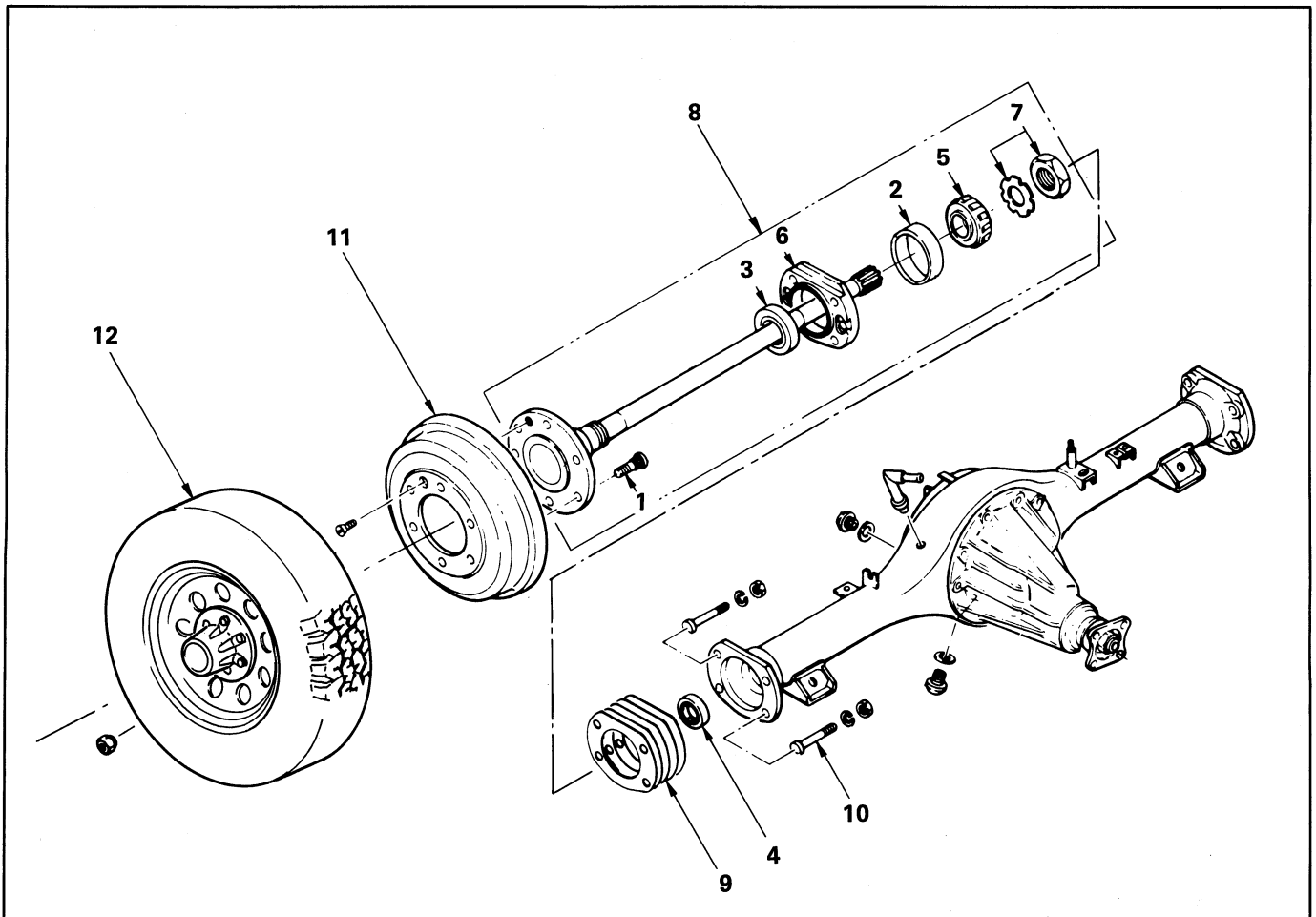
Check the axle shaft flange for run-out. Hold the probe of a dial indicator in contact with the flange. Rotate the shaft slowly and observe the dial.

Limit	mm(in.)	0.08 (0.003)
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REASSEMBLY

1. Refer to Section 08 "TIRE & WHEEL" for road wheel reassembly procedure.
2. Refer to Section 09 "BRAKE" for rear brake installation procedure.

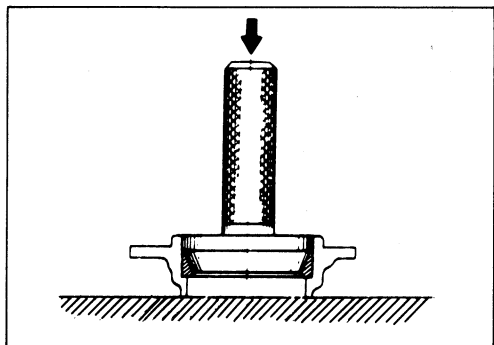


Reassembly steps

- | | |
|---------------------------|-----------------------------|
| 1. Wheel pin | ▲ 7. Bearing nut and washer |
| ▲ 2. Bearing outer race | ▲ 8. Axle shaft assembly |
| ▲ 3. Oil seal | ▲ 9. Shim |
| ▲ 4. Oil seal ; axle case | ▲ 10. Nuts and bolts |
| ▲ 5. Bearing | 11. Brake drum |
| ▲ 6. Bearing holder | ▲ 12. Wheel and tire |



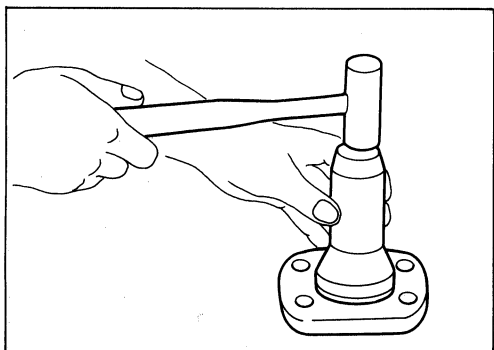
Important operations



2. Bearing outer race

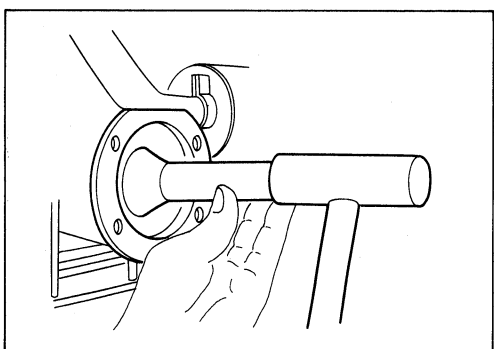
Installer : J-24259

Grip : J-8092



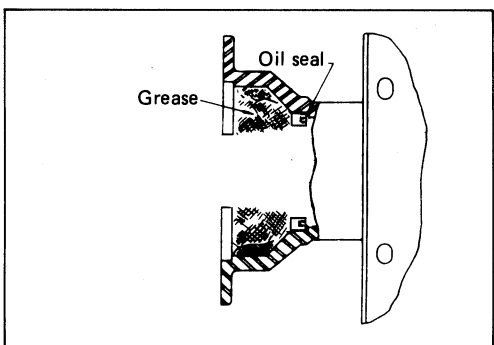
3. Oil seal ; bearing holder

Installer : J-24255



4. Oil seal ; axle case

(1) Installer : J-24254



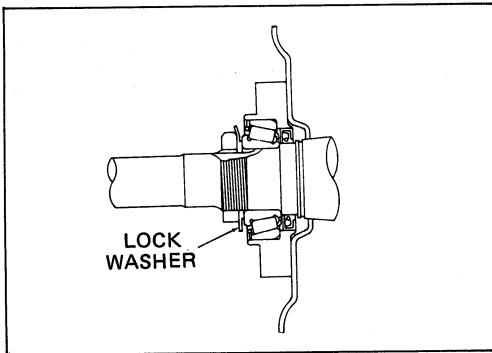
(2) Apply measured amount of good quality grease to the inner face of the rear axle case.

Type of grease:	Wheel bearing grease of multipurpose type grease
Amount of grease required: g (oz)	80 (2.8)



5. Bearing

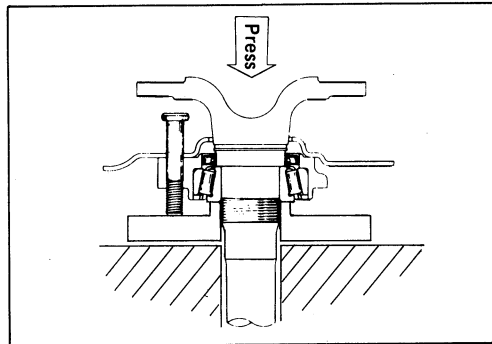
Apply a generous amount of grease to the bearing inner race.



6. Bearing holder

7. Bearing nut and washer

- (1) Install the new lock washer so that the dished side is away from the bearing, and then thread the bearing nut onto axle shaft.

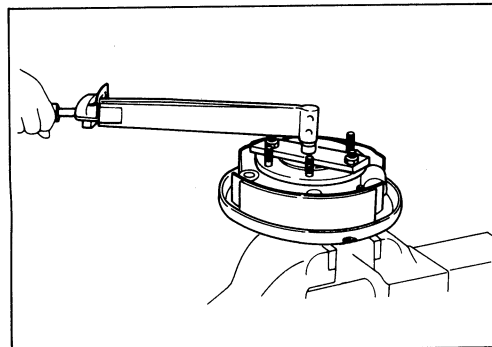


8. Axle shaft assembly

- (1) Insert four through-bolts into the back plate.
- (2) Attach the bearing holder to the back plate.
- (3) Attach the above parts to the axle shaft.
- (4) Attach the bearing over axle shaft and press it into bearing holder.



Installer : J-8609-01

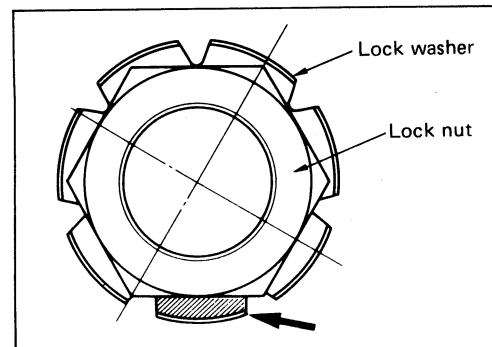


- (2) Move the bearing nut into position by using a press and the special tool.

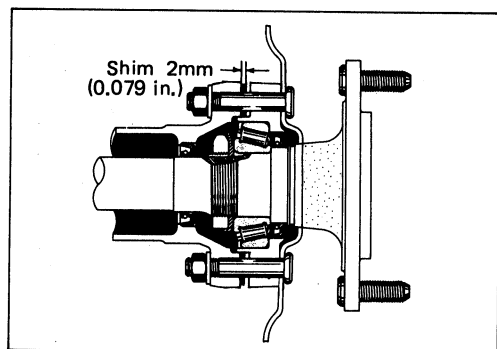
Installer : J-24246



Torque	kg-m(ft.lbs.)	26 - 27 (188 - 195)
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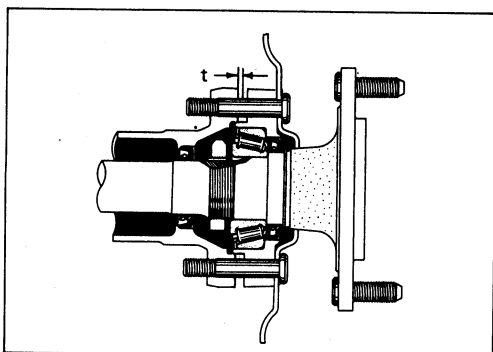
- (3) Make sure to bend up the portion of the lock washer opposite the tab.



9. Shim

Install the axle shaft assembly to the axle case with a 2 mm (0.079 in.) thick shim fitted in position between the bearing holder and the axle case flange. Install and tighten the bolts evenly in progression.

Torque	kg-m(ft.lbs.)	7.0 — 8.0 (51 — 58)
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Install the axle shaft assembly on the opposite side and push it in until it is fitted against the differential thrust block.

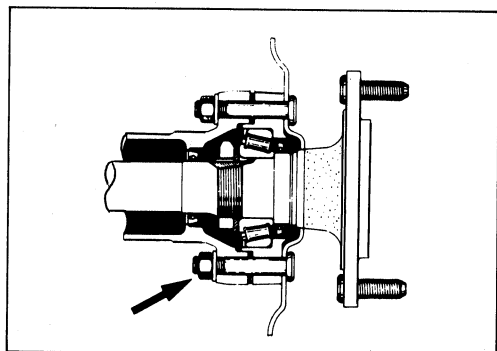
Then, measure the clearance (t) between the bearing holder and the axle case flange and determine the thickness of the shim to be installed by the following formula:

Measured clearance (t) + 0.3 mm (0.012 in.) = thickness of shim to be installed

Thickness of shims available mm(in.)

1.0, 0.5, 0.13, 0.076, 0.05

(0.039, 0.026, 0.005, 0.003, 0.002)

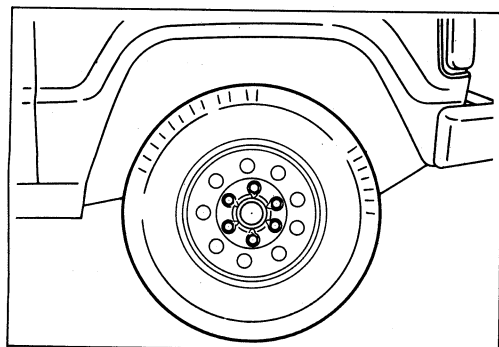


10. Nuts and bolts

Torque	kg-m(ft.lbs.)	7.0 — 8.0 (51 — 58)
--------	---------------	---------------------

- Connect the brake pipes to the wheel cylinder.
- Connect the parking brake rear cable.
- Brake air bleeding, refer to servicing Section 09 Brake.

Note: To install the axle shaft assembly, follow the reassembly procedure outline under the "BRAKE".



12. Wheel and tire

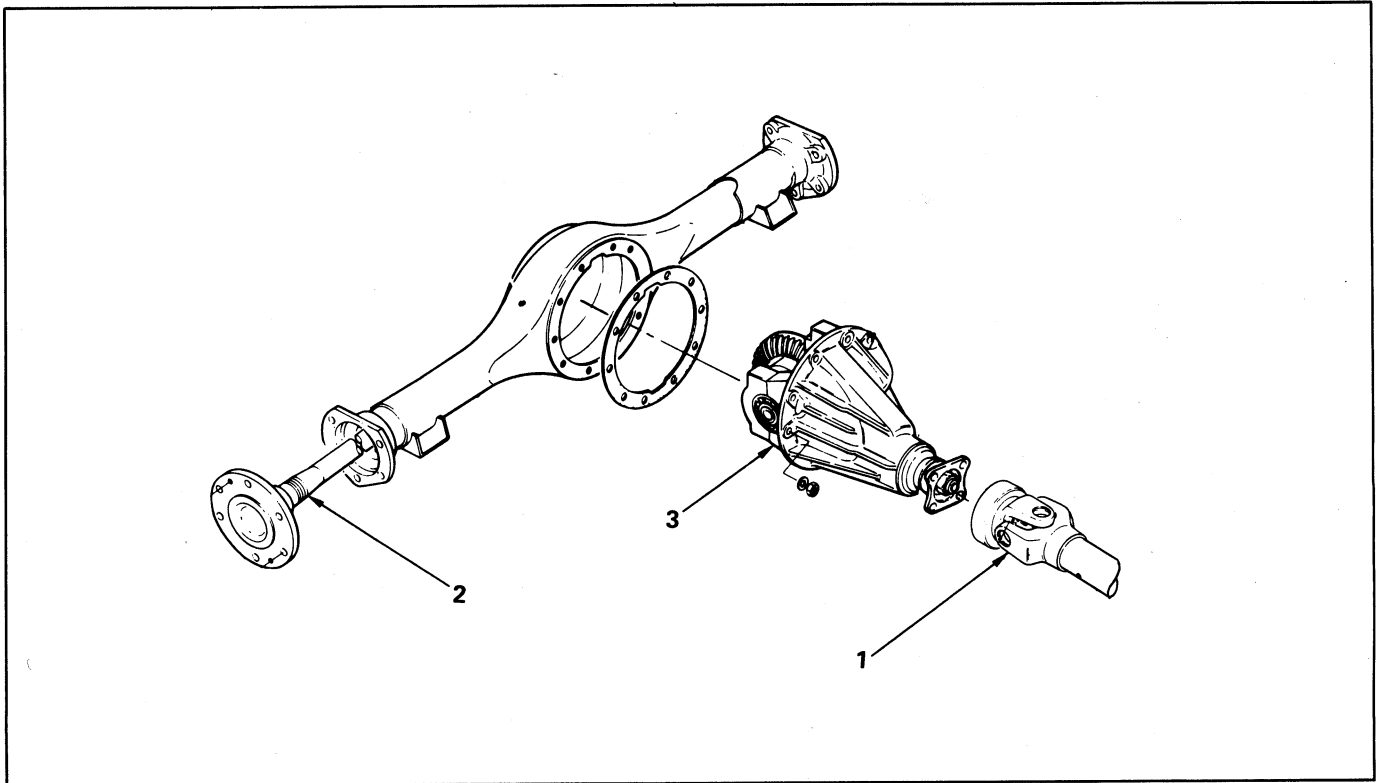
Torque	kg-m(ft.lbs.)	8 — 11 (58 — 80)
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Tighten the wheel nuts in numerical order.

DIFFERENTIAL



REMOVAL AND INSTALLATION



Removal steps

1. Propeller shaft
- ▲ 2. Axle shaft
3. Differential assembly

Installation steps

- ▲ 3. Differential assembly
- ▲ 2. Axle shaft
- ▲ 1. Propeller shaft



Important operation — Removal

2. Axle shaft

Disengage the axle shafts from the carrier assembly and partially withdraw the shafts from the axle tube.

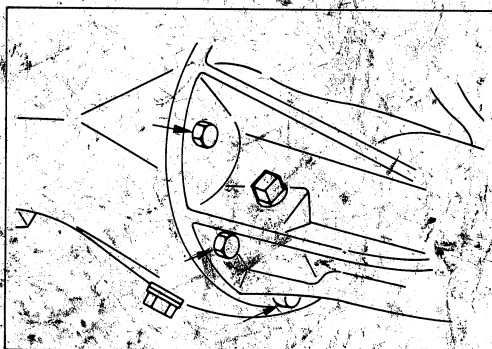
It is not necessary to completely remove axle the shafts.

Move them only enough to allow the differential to be removed.

To remove the axle shaft assembly, follow the disassembly procedure outline in this Section "Axle shaft"



Important operations — Installation



3. Differential assembly

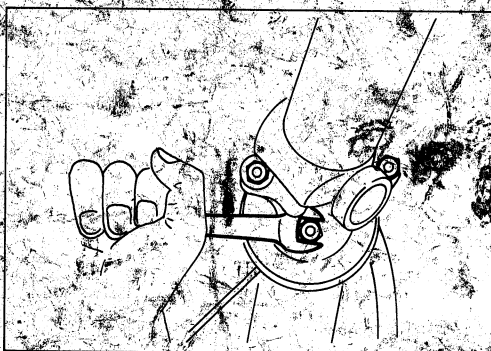
Nut and bolt torque	kg-m(ft.lbs.)	2.3 — 2.7 (17 — 20)
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To install the axle shaft assembly, follow the reassembly procedure outline in the "Rear axle shaft" Section.



2. Axle shaft

Torque	kg-m(ft.lbs.)	7.0 — 8.0 (51 — 58)
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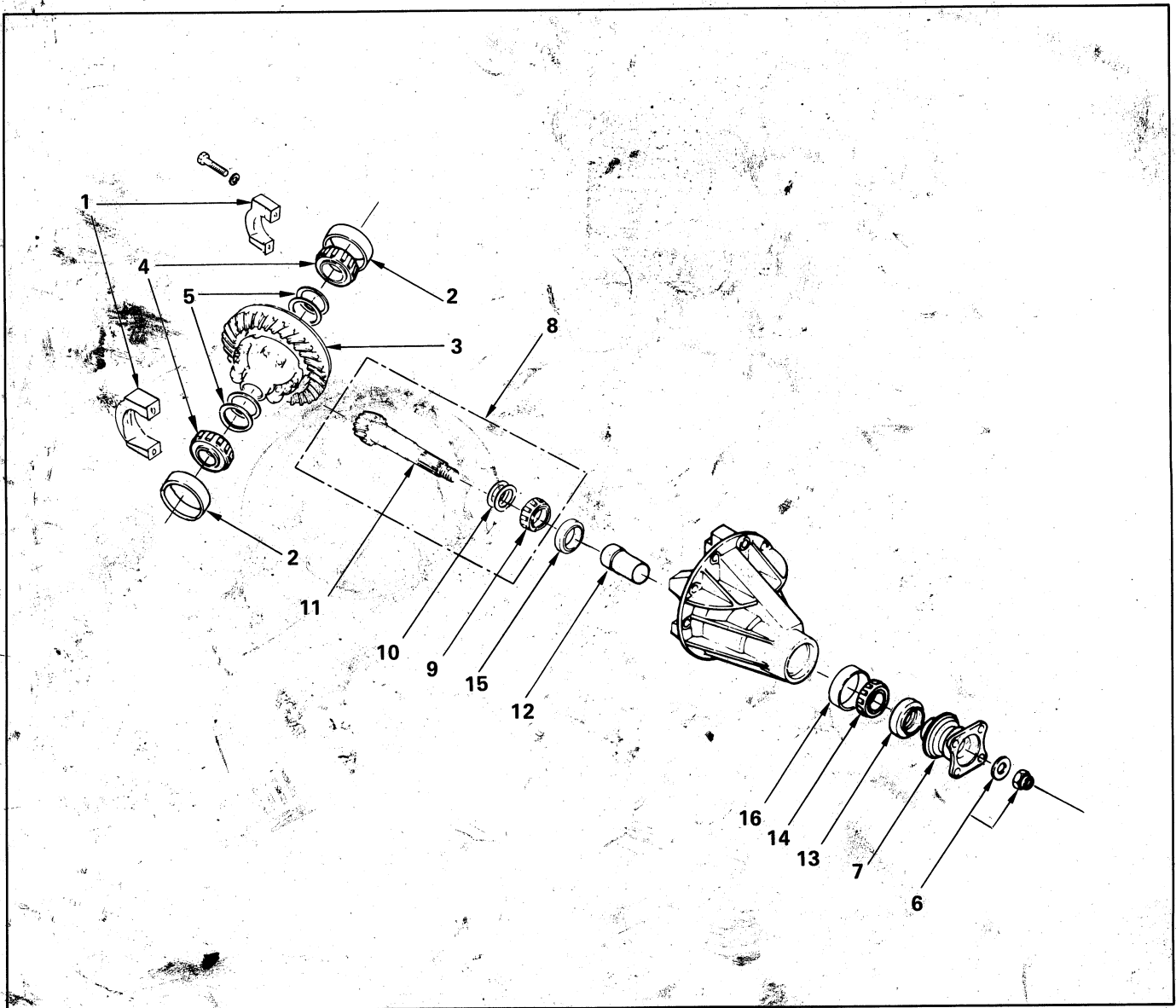
1. Propeller shaft

Torque	kg-m(ft.lbs.)	2.6 — 3.0 (19 — 22)
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DISASSEMBLY

MAJOR COMPONENTS



Disassembly steps

- ▲ 1. Side bearing caps
- ▲ 2. Side bearing outer races
- ▲ 3. Differential cage assembly and ring gear
- ▲ 4. Side bearing
- ▲ 5. Backlash and side bearing preload adjusting shim
- ▲ 6. Flange nut and washer
- ▲ 7. Flange assembly
- ▲ 8. Drive pinion shaft assembly
- ▲ 9. Inner bearing
- ▲ 10. Shim; inner bearing
- ▲ 11. Drive pinion shaft
- ▲ 12. Collapsible spacer
- ▲ 13. Oil seal
- ▲ 14. Outer bearing
- ▲ 15. Inner bearing outer race
- ▲ 16. Outer bearing outer race

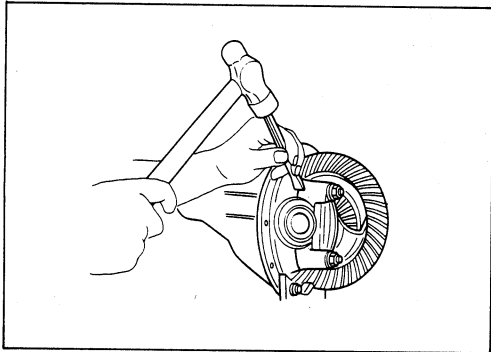


Important operations

Before disassembling, make a pattern check using the method described later in this section under "Gear Tooth Contact Pattern Check and Adjustments". This check will help determine what service should be performed on the differential components.

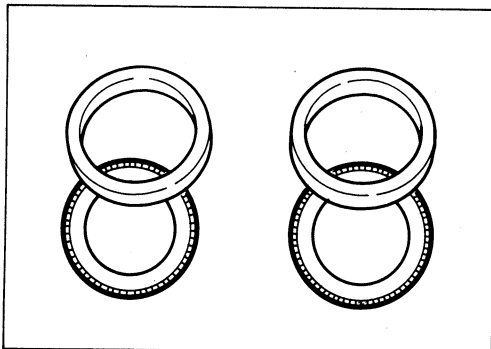


On some bench operations, it may be advantageous to use a holding fixture and a holding fixture base. Tool J-21533 and J-3289-20 are an available tools that work well for this purpose.



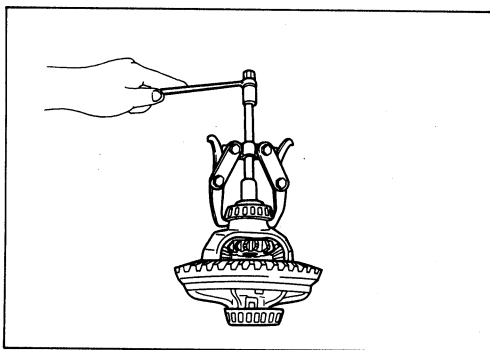
1. Bearing cap

Apply a setting mark to the side bearing cap and differential carrier.



2. Side bearing outer race

After removal, keep the right and left side bearing assemblies separate to maintain inner and outer race combinations.



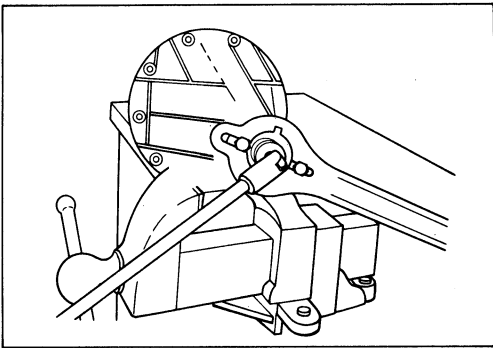
4. Side bearing and preload adjusting shim

5. Backlash and side bearing prelead adjustig shim.

Remover : J-22888

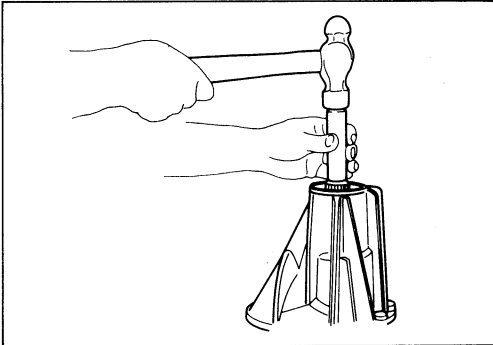
Adapter : 8107-2

Carefully record the thickness of each side bearing and each shim pack. Keep the separated and in order for later reassembly.



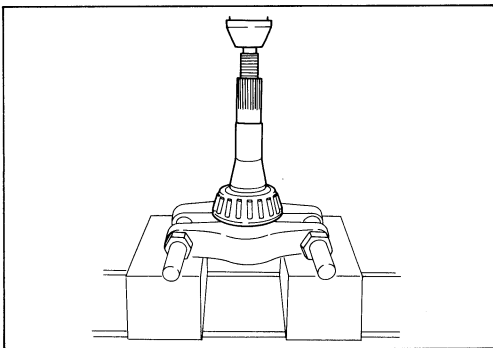
6. Flange nut and washer

Holder : J-8614-01



8. Drive pinion shaft assembly

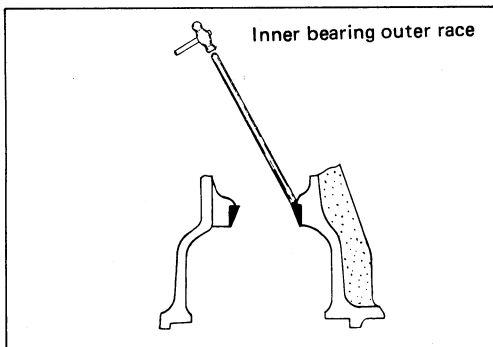
Hold a soft metal rod against the end of the drive pinion. Drive out the pinion from the carrier by tapping the hammer against the metal rod.



9. Inner bearing

Remove the pinion bearing using a separator and a press.

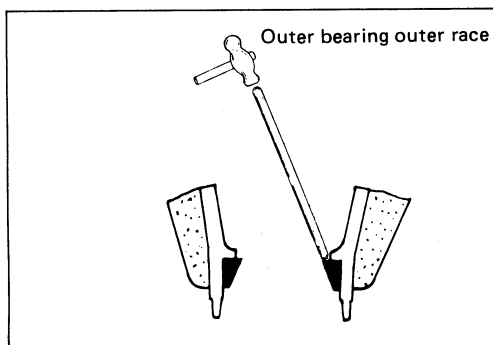
Separator : J-22912-01



15. Inner bearing outer race

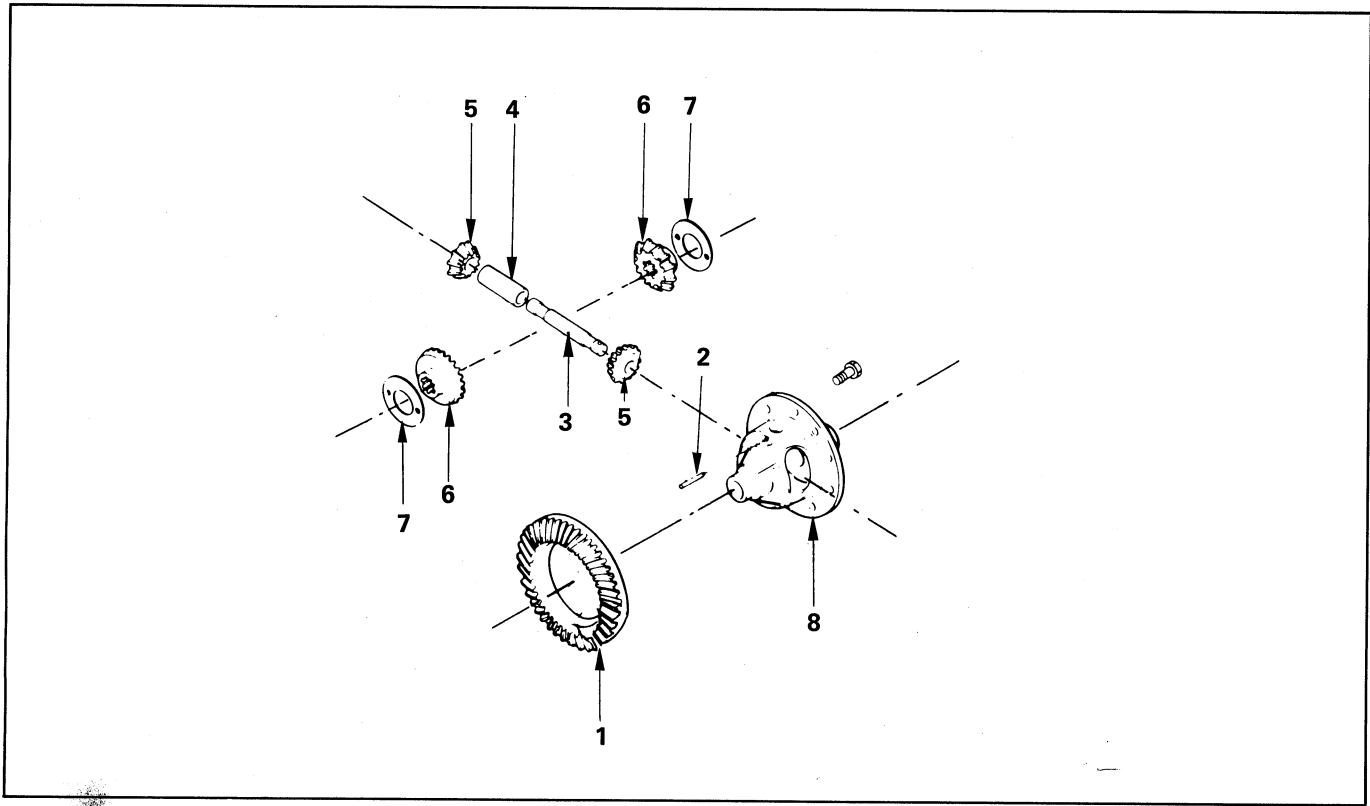
16. Outer bearing outer race

Remove the inner bearing outer race and the outer bearing outer race by using a brass bar and a hammer.



MINOR COMPONENTS

Differential assembly

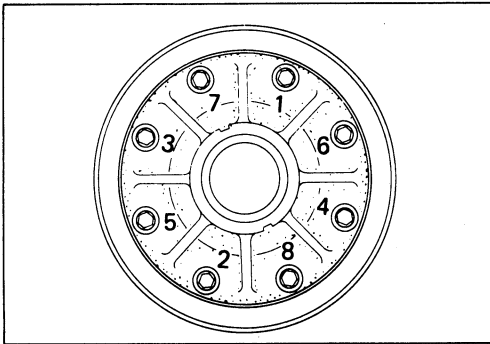


Disassembly steps

- | | |
|-----------------|---------------------|
| ▲ 1. Ring gear | 5. Pinion gear |
| ▲ 2. Lock pin | 6. Side gear |
| ▲ 3. Cross pin | 7. Thrust washer |
| 4. Thrust block | 8. Differential box |

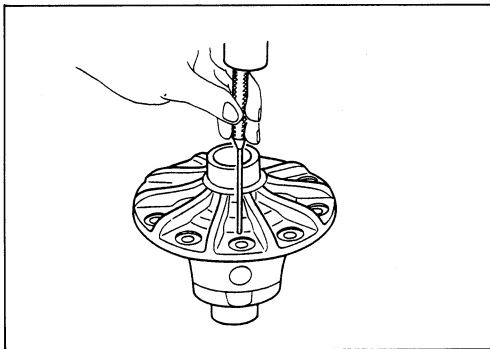


Important operations



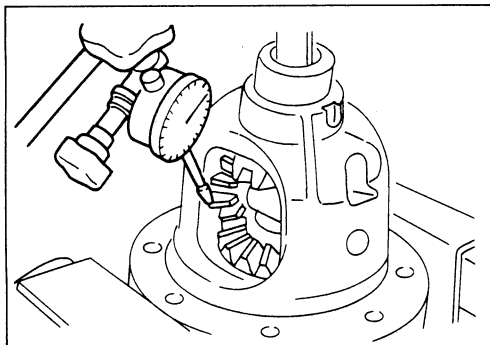
1. Ring gear

Take care not to damage the ring gear or the differential case when removing the ring gear. Never try to wedge a tool between the two faces.



2. Lock pin

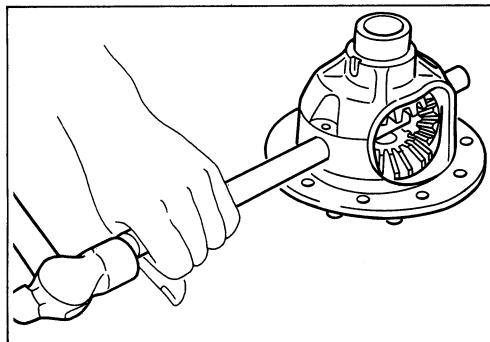
Drive out the pinion shaft lock pin with a long drift. It may be necessary to first remove the caulking in the lock pin with a 5 mm drill.



3. Cross pin

(1) Check the amount of backlash before removal.

Backlash	mm(in.)	0.03 — 0.08 (0.001 — 0.003)
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(2) Remove the cross pin with a brass drift, and take out the thrust block, pinion gears, side gears and thrust washers from the differential cage.



INSPECTION AND REPAIR

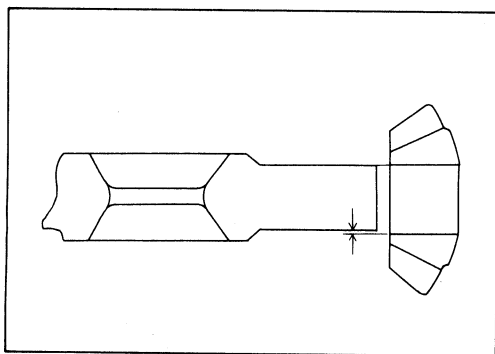
Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Gear
- Bearing
- Oil seal
- Differential cage
- Drive pinion



Visual check

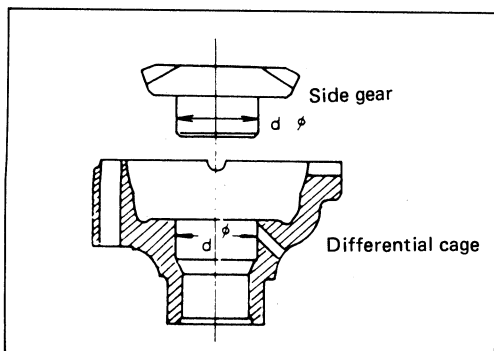
Inspect the following parts for wear, damage, or other abnormal conditions.



Clearance between the pinion gear and the cross pin

mm(in.)

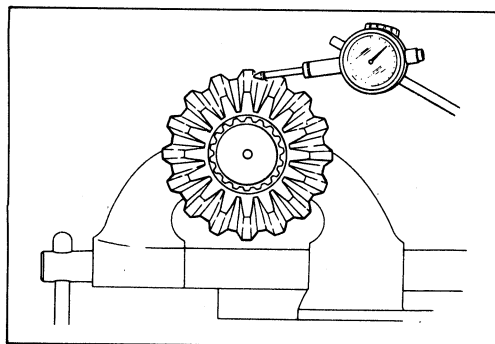
Standard	Limit
0.06 — 0.12 (0.002 — 0.005)	0.2 (0.008)



Clearance between the side gear and the differential cage

mm(in.)

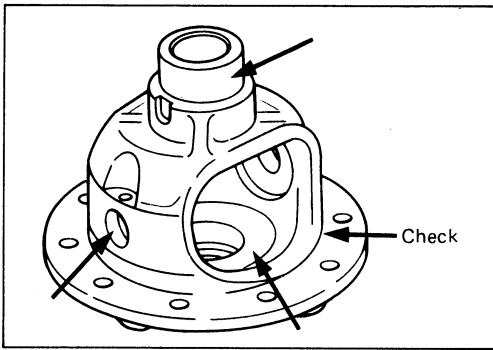
Standard	Limit
0.05 — 0.12 (0.002 — 0.005)	0.15 (0.006)



Play in spline between the side gear and the axle shaft

(mm)

Standard	Limit
0.13 (0.005)	0.25 (0.01)



Differential gear box

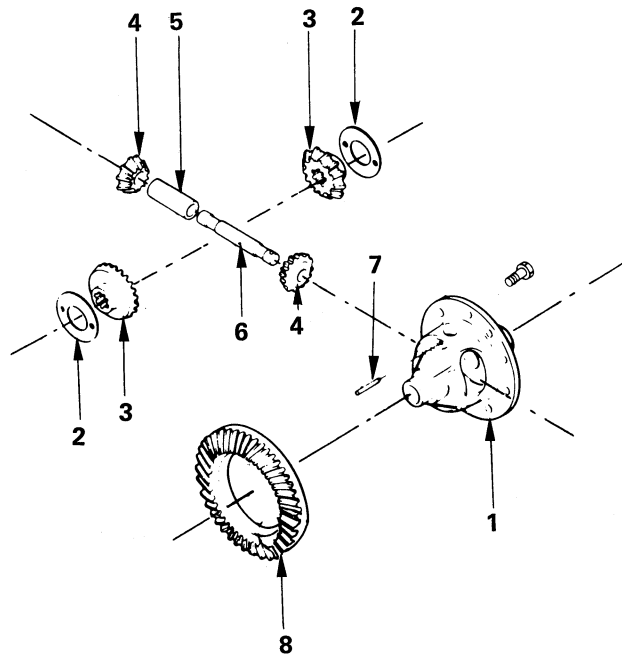
Check the portions to ring gear and side gear which the hole into the cross pin.



REASSEMBLY

MINOR COMPONENTS

Differential assembly



Reassembly steps

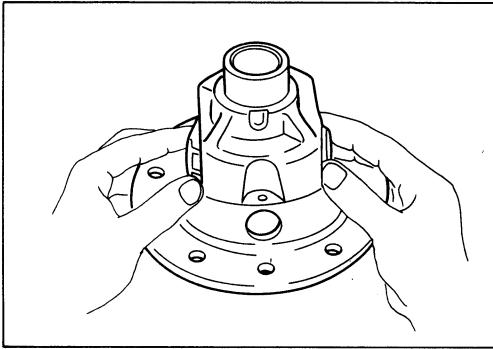
- | | |
|---------------------|-----------------|
| 1. Differential box | 5. Thrust block |
| 2. Thrust washer | ▲ 6. Cross pin |
| 3. Side gear | ▲ 7. Lock pin |
| ▲ 4. Pinion gear | ▲ 8. Ring gear |



Important operations

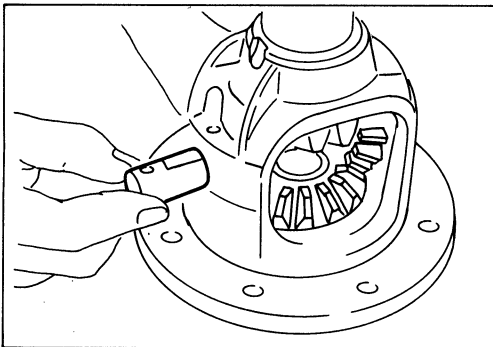
4. Pinion gear

Install the pinion gear by engaging it with the side gears while turning both pinion gears simultaneously in the same direction.



6. Cross pin

- (1) Be sure to install the cross pin so that it is in alignment with the lock pin hole in the differential box.



- (2) Backlash between the side gear and the pinion gear



Backlash	mm(in.)	0.03—0.08(0.0012—0.0031)
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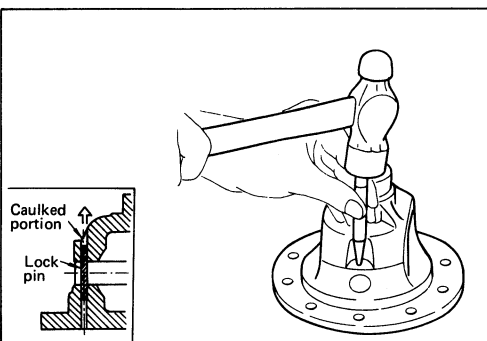
If the backlash is beyond the limits, adjust with a thrust washer of selected thickness.

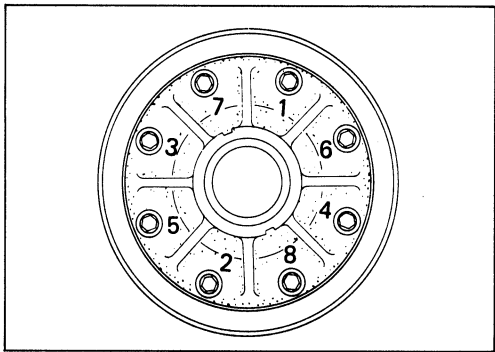
Thicknesses of thrust washers available.

mm	1.00	1.05	1.10
in.	0.039	0.041	0.043

7. Lock pin

After lock pin installation, caulk the cage to prevent removal of the lock pin from falling out.





8. Ring gear

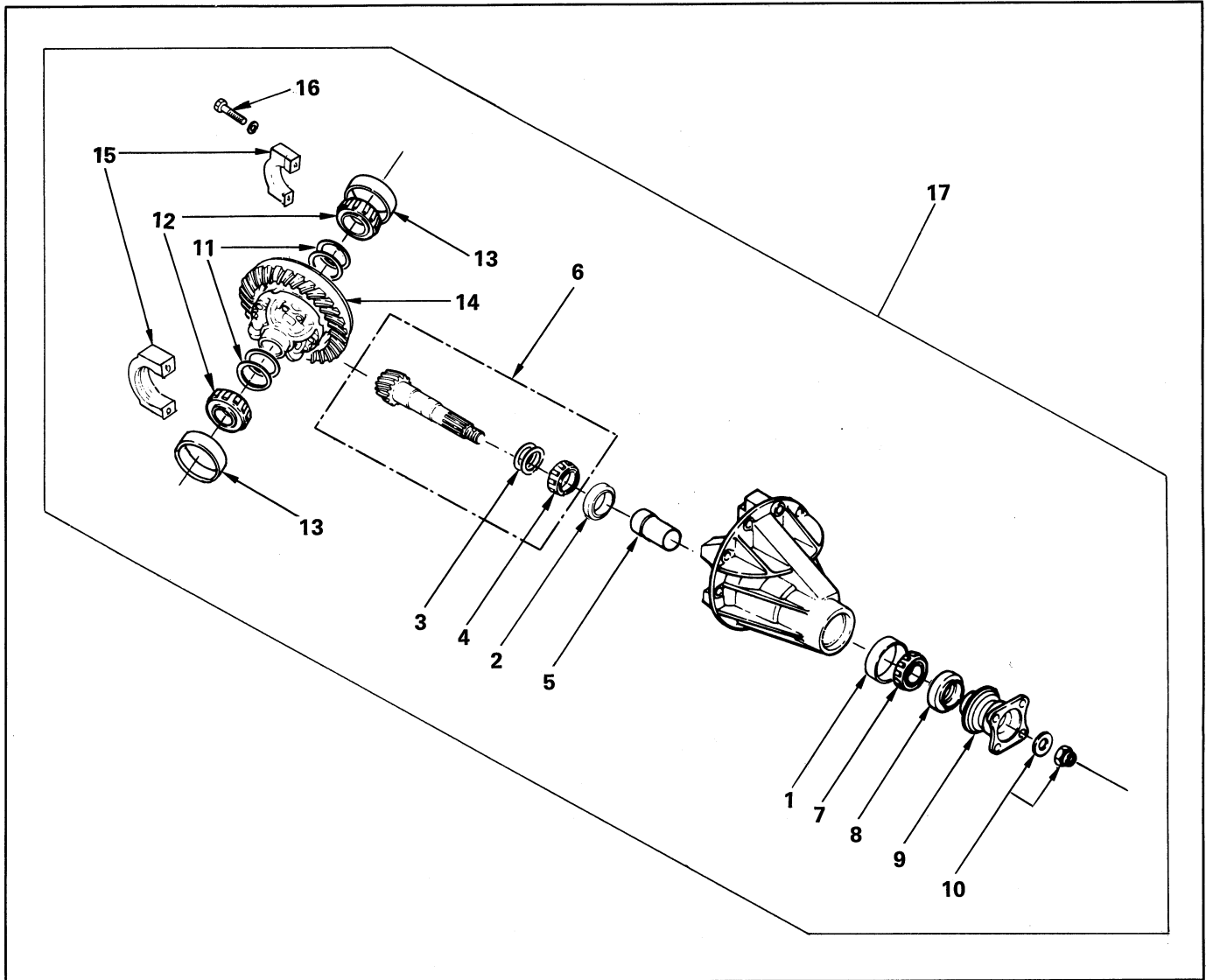
When installing the ring gear, apply the stud lock to the threaded holes and bolts after treatment of the bolts with primer N.

Torque	kg-m(ft.lbs.)	10 – 12 (72 – 87)
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Tighten the bolts in numerical order.

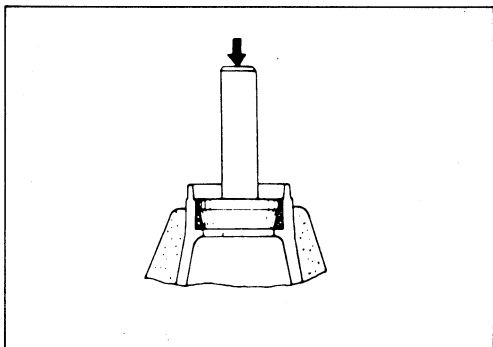
Discard used bolts and install new ones.

MAJOR COMPONENTS



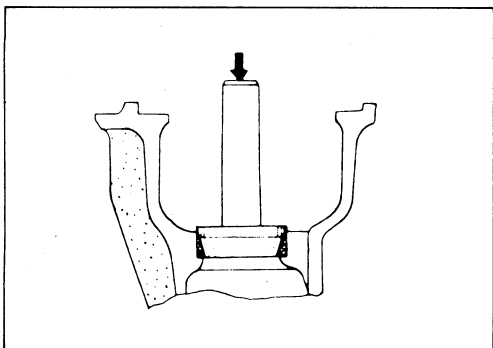
Reassembly steps

- | | |
|-----------------------------------|--|
| ▲ 1. Outer bearing outer race | ▲ 10. Flange nut and washer |
| ▲ 2. Inner bearing outer race | ▲ 11. Backlash and pre-load adjusting shim |
| ▲ 3. Shim; pinion depth adjusting | ▲ 12. Side bearing |
| ▲ 4. Inner bearing | ▲ 13. Side bearing outer race |
| ▲ 5. Collapsible spacer | ▲ 14. Differential cage assembly and ring gear |
| 6. Drive pinion assembly | ▲ 15. Bearing cap |
| 7. Outer bearing | ▲ 16. Bolt |
| ▲ 8. Oil seal | ▲ 17. Differential assembly |
| ▲ 9. Pinion flange assembly | |

**Important operations****1. Outer bearing outer race**

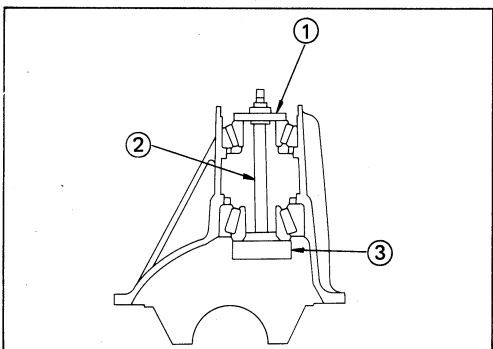
Installer : J-24256

Grip : J-8092

**2. Inner bearing outer race**

Installer : J-24252

Grip : J-8092

**3. Shim ; pinion depth adjusting**

Adjustment of drive pinion mounting distance.



- (1) Apply gear oil to the drive pinion bearing, inner and outer.
Clean all of the pinion setting gage sets.
Then install the gage set together with the inner and outer bearings.



① Pilot : J-21777-42

② Stud and nut : J-23597-9

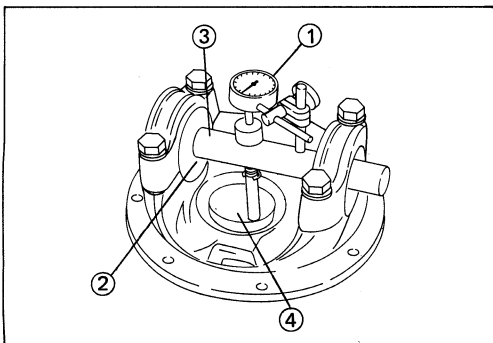
③ Gage plate : J-23597-7



Tighten the nut to the specified torque.

kg-cm(in.lbs.)

New bearing	23 (20)
Used bearing	10 — 12 (8 — 10)



- (2) Clean the side bearing bores. Install a dial indicator with discs and arbor. Then install and tighten the bearing caps to the specified torque.



Torque	kg-m(ft.lbs.)	9.5 — 10.5 (69 — 76)
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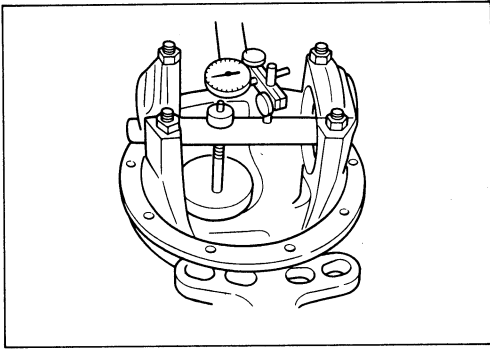


① Dial indicator : J-8001

② Disc (2 pcs.) : J-23597-8

③ Arbor : J-23597-1

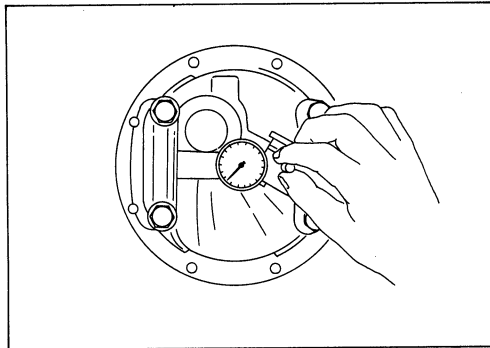
④ Gage plate : J-23597-7



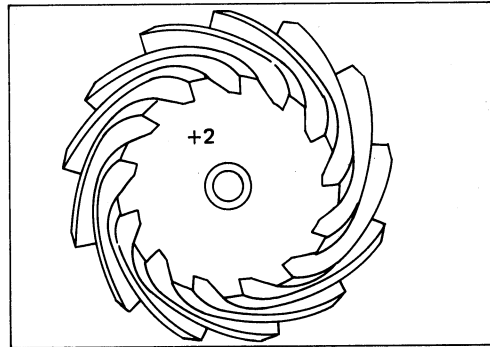
- (3) Set the dial indicator to "0". Place it on the mounting post of the gauging arbor with the contact button touching the indicator pad. Force the dial indicator downward until the needle has made a half turn clockwise. Tighten down the dial indicator in this position.

Now move the gauging arbor slowly back and forth and locate the position at which the dial indicator shows the greatest deflection. At this point, once again set the dial indicator to "0".

Repeat the procedure to verify the "0" setting.



- (4) After the ZERO setting is obtained, rotate the gaging arbor until the dial indicator rod does not touch the gaging plate. Record the number the dial indicator needle points to.



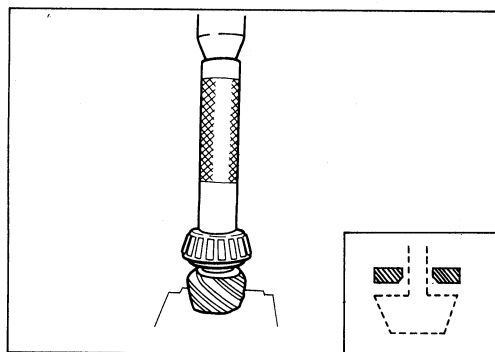
- (5) Record the pinion depth code on the head of the drive pinion.
- (a) The number indicates a necessary change in the pinion mounting distance. A plus number indicates the need for a greater mounting distance (which can be achieved by decreasing the shim thickness). A minus number indicates the need for a smaller mounting distance (which can be achieved by increasing the shim thickness). If examination reveals pinion depth code "0", the pinion is "nominal".
- (b) Use the chart below to determine the proper shim variation to compensate for plus or minus markings.

07A—30 REAR AXLE AND REAR PROPELLER SHAFT

(6) Select the shim using a chart

Pinion marking Dial indicator reading (Inches)	+10	+8	+6	+4	+2	0	-2	-4	-6	-8	-10
0.081											2.18(0.0858)
0.082										2.18(0.0858)	2.20(0.0866)
0.083									2.18(0.0858)	2.20(0.0866)	2.24(0.0882)
0.084								2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)
0.085						2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)
0.086					2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)
0.087				2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)
0.088				2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)
0.089			2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)
0.090		2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)
0.091	2.18(0.0858)	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)
0.092	2.20(0.0866)	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)
0.093	2.24(0.0882)	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)
0.094	2.26(0.0890)	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)
0.095	2.28(0.0898)	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)
0.096	2.32(0.0914)	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)
0.097	2.34(0.0921)	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)	
0.098	2.36(0.0929)	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)		
0.099	2.38(0.0937)	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)			
0.100	2.42(0.0953)	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)				
0.101	2.44(0.0961)	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)					
0.102	2.46(0.0969)	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)						
0.103	2.48(0.0977)	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)							
0.104	2.52(0.0992)	2.54(0.1000)	2.56(0.1008)								
0.105	2.54(0.1000)	2.56(0.1008)									
0.106	2.56(0.1008)										

Note: When ordering shims, find the part number in the Parts Catalog by using the thickness of the shims listed in the above table.



4. Inner bearing

Place the shim on the drive pinion with the chamfered side turned toward the pinion head, then attach the inner bearing to the pinion using an installer and a press.

Installer : J-6133-01

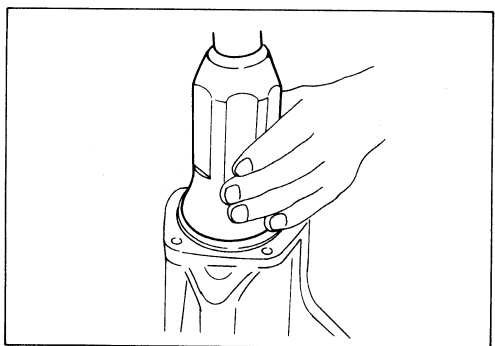


NOTE: Do not press on the roller cage.
Press only on the inner race.



5. Collapsible spacer

Discard the used collapsible spacer and install a new one.

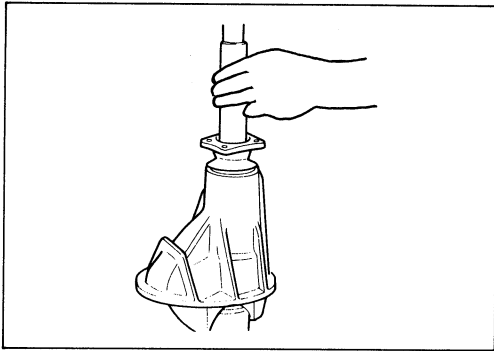


8. Oil seal

Use the oil seal installer to install a new oil seal that has been soaked in rear axle lubricant.

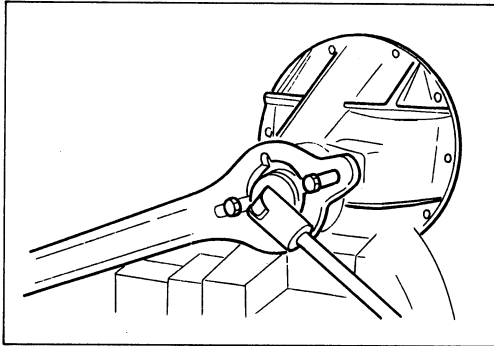
Installer : J-24250





9. Pinion flange assembly

Pinion flange installer : J-6403-C



10. Flange nut and washer

- (1) Apply lubricant to pinion threads.
- (2) Tighten the nut to the specified torque using the pinion flange holder.

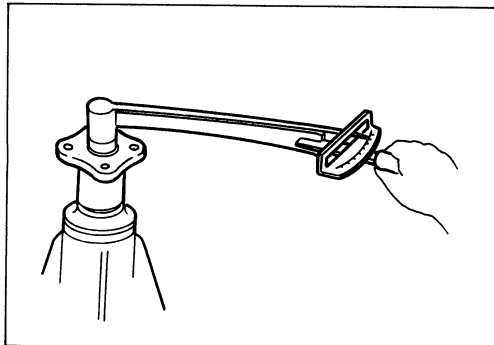
Pinion flange holder : J-8614-01



Torque	kg-m(ft.lbs.)	11.5 — 12.5 (83 — 90)
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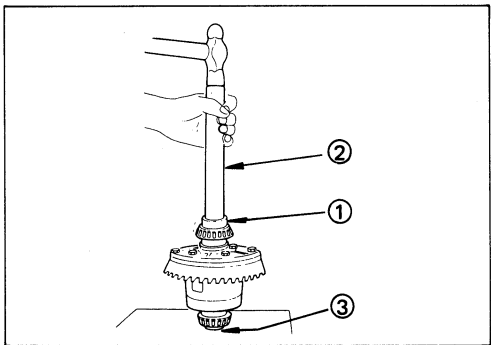
Discard used flange nut and install new ones.



(3) Pinion bearing preload.

- (a) Measure the bearing preload by using a torque meter.
Note the scale reading required to rotate the flange.
- (b) Continue tightening until the specified starting torque is obtained.

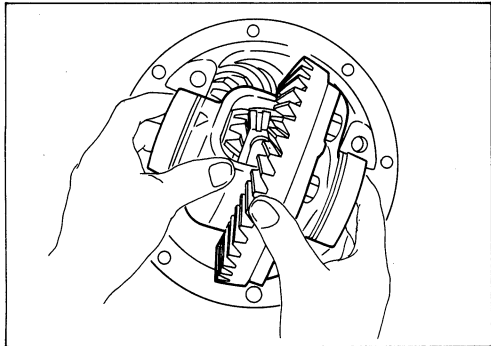
	kg-cm(in.lbs.)
Starting torque	6.5 — 11.5 (5.6 — 10)



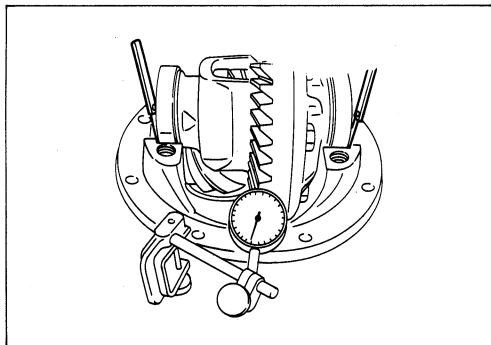
11. Backlash and pre-load adjusting shim

- (1) Attach the side bearing to the differential assembly without shims. Support the opposite side using a pilot to prevent bearing damage.

- ① Installer : J-24244
- ② Drive handle : J-8092
- ③ Pilot : J-8107-2

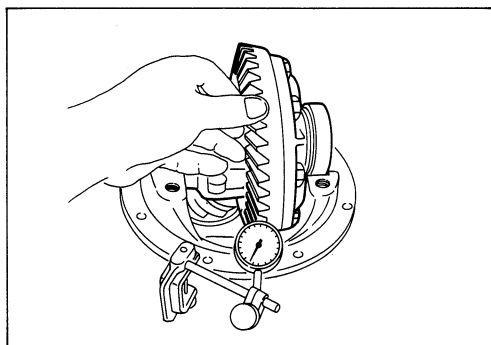


- (2) Position the differential cage assembly with the bearing outer races to the side bearing bores of the carrier.



- (3) Using two sets of feeler gauges, insert a feeler stock of sufficient thickness between each bearing outer race and the carrier to remove all end play. Make certain the feeler stock is pushed to the bottom of the bearing bores. Mount the dial indicator on the carrier so that the indicator stem is at right angles to a tooth on the ring gear.

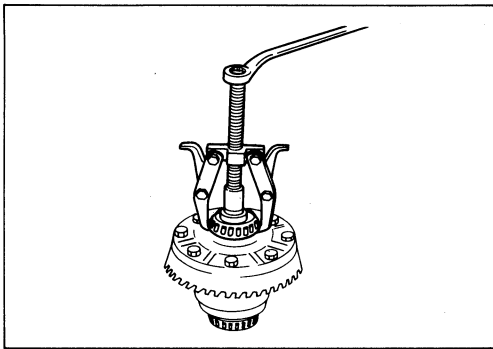
Dial indicator : J-8001



- (4) Adjust the feeler gauge thickness from side to side until the ring gear backlash is in the specified range.

Backlash	mm(in.)	0.13 — 0.18 (0.005 — 0.007)
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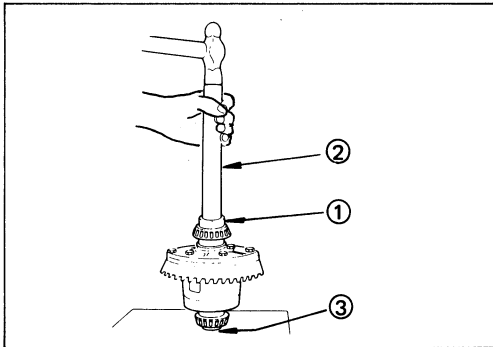
With zero end play and correct backlash established, remove feeler gauge packs, determine the thickness of shims required and add 0.05 mm (0.002 in.) to each shim pack to provide side bearing preload. Always use new shims.



(5) Remove side bearing

Remover : J-22888

Pilot : J-8107-2



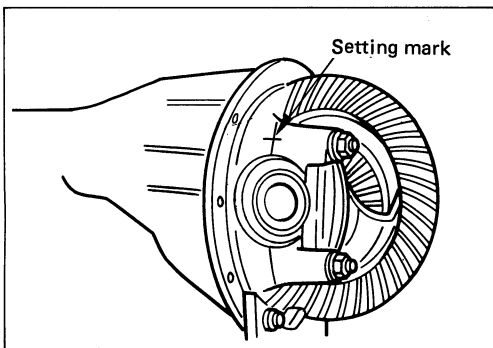
12. Side bearing

Install side bearings together with selected shims.

① Installer : J-24244

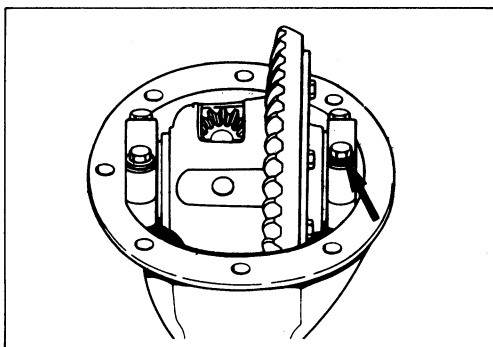
② Drive handle : J-8092

③ Pilot : J-8107-2



15. Bearing cap

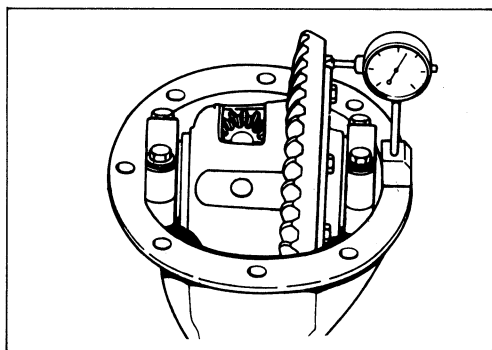
Align the setting marks applied at the time of disassembly.



16. Bolt

Torque		kg-m(ft.lbs.)	9.5 — 10.5 (69 — 76)
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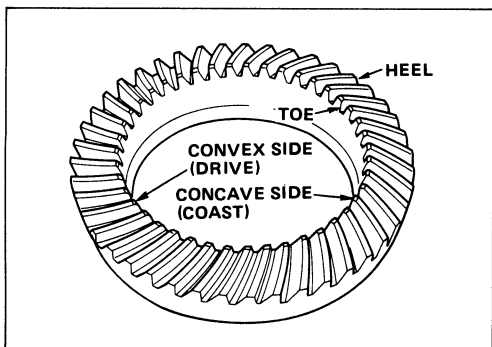
07A-34 REAR AXLE AND REAR PROPELLER SHAFT



Measure the amount of run-out of the ring gear at its rear face.

mm(in.)

Standard	Limit
0.02 (0.001)	0.05 (0.002)

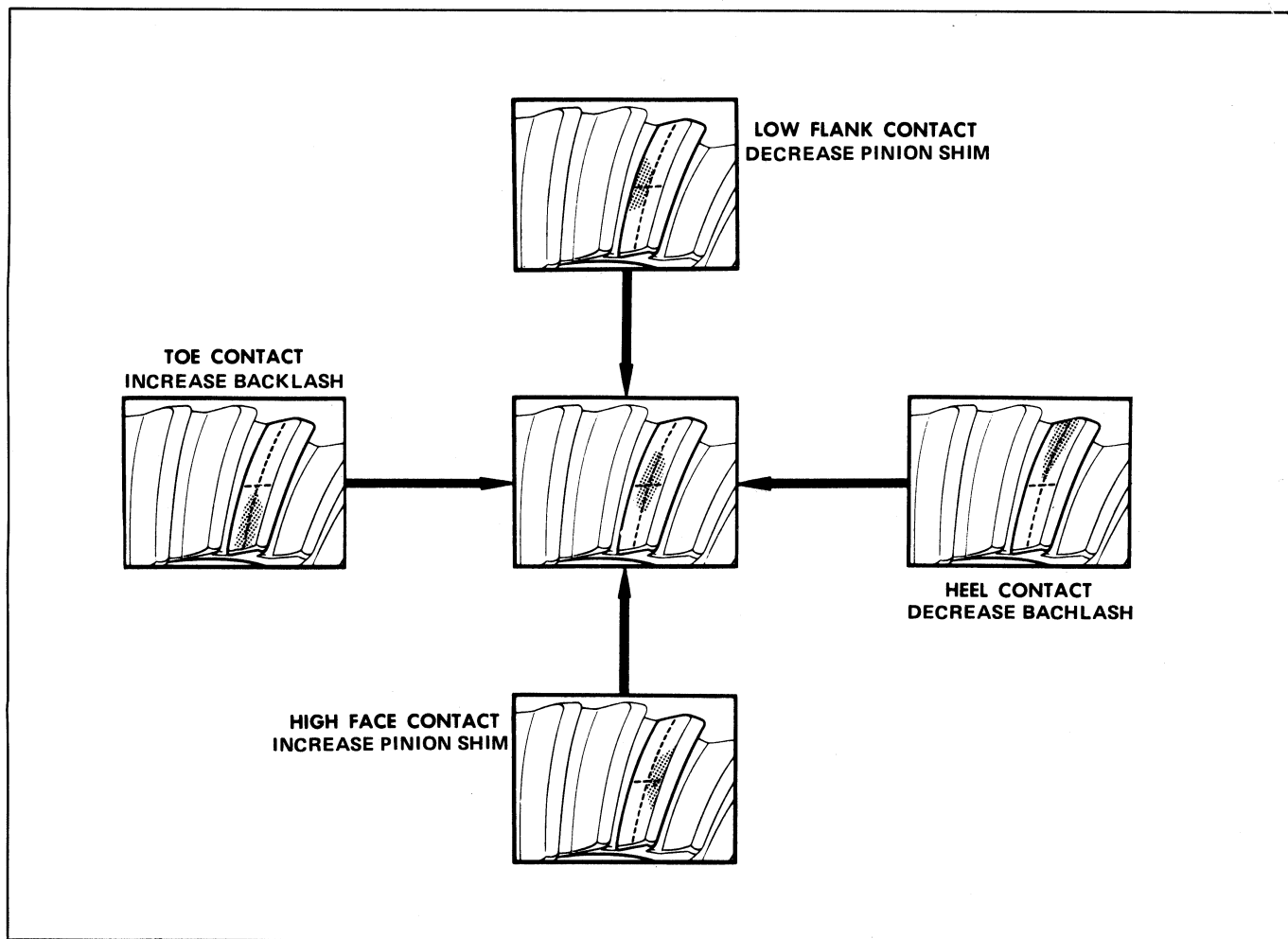


Gear tooth contact pattern check and adjustment

Apply a thin coat of prussian blue or equivalent to the faces of the 7 - 8 teeth of the ring gear. Check the impression of contact obtained on the ring gear teeth and make necessary adjustment as described below if the contact is abnormal.



- 1 : Tow
- 2 : Heel



17. Differential assembly



- (1) Clean the faces of the rear axle case and differential carrier and apply a thin coat of liquid gasket. Install the gasket.



- (2) Mount the differential case and the carrier assembly to the rear axle case and tighten the nuts and bolts.

Torque		kg-m(ft.lbs.)	2.2 — 2.8 (16 — 20)
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- (3) Install the axle shaft assemblies as instructed earlier in this section under "Axle Shaft Reassembly".

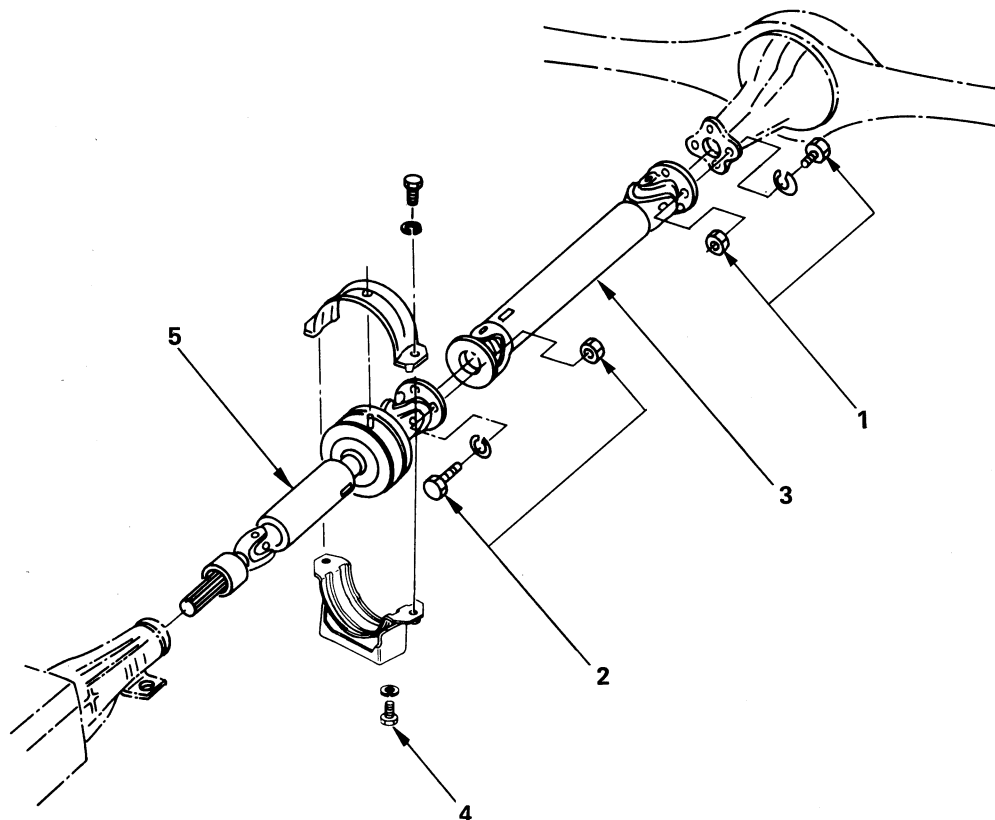


- (4) Fill the axle case with hypoid gear lubricant to just below the filler hole. Lubricant capacity is 1.5 liter (0.4 gal.)

PROPELLER SHAFT



REMOVAL AND INSTALLATION



Since the propeller shaft assembly is carefully balanced, a setting mark should be applied to the flange, before removal.

Install the parts by aligning the setting marks applied at the times of removal.

Removal steps

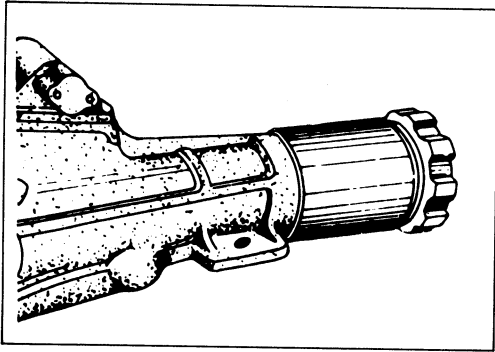
1. Bolt ; differential side
2. Bolt ; flange
3. Propeller shaft assembly ; 2nd
4. Bolt ; center bearing bracket
- ▲ 5. Propeller shaft assembly ; 1st

Installation steps

5. Propeller shaft assembly ; 1st
- ▲ 4. Bolt ; center bearing bracket
3. Propeller shaft assembly ; 2nd
- ▲ 2. Bolt ; flange
- ▲ 1. Bolt ; differential side



Important operation — Removal



5. Propeller shaft assembly

Install a plug or equivalent at the transmission rear cover to prevent loss of the transmission oil.



Important operations — Installation



4. Bolt ; center bearing bracket

Torque	kg-m(ft.lbs.)	6.0 — 6.4 (43 — 46)
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2. Bolt ; flange

Torque	kg-m(ft.lbs.)	2.6 — 3.0 (19 — 22)
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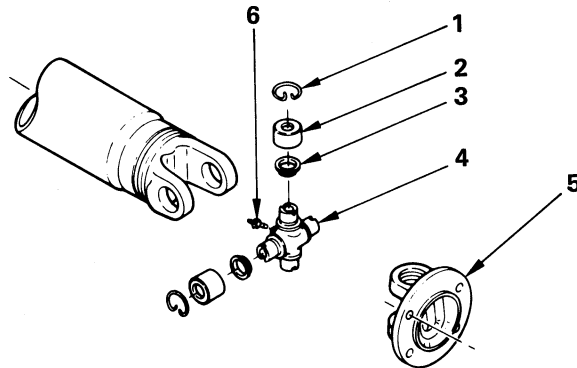
1. Bolt ; differential side

Torque	kg-m(ft.lbs.)	2.6 — 3.0 (19 — 22)
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DISASSEMBLY

UNIVERSAL JOINT



Disassembly steps

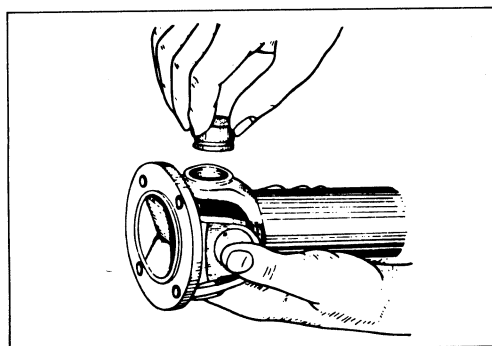
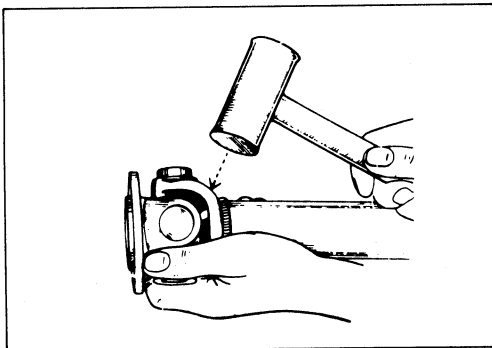
- | | |
|----------------------------|-------------------|
| 1. Snap ring | 4. Spider |
| ▲ 2. Needle roller bearing | 5. Flange yoke |
| 3. Seal | 6. Grease fitting |



Important operation

2. Needle roller bearing

- (1) Tap out the bearing by gently striking the shoulder of the yoke.
Using a mallet or a copper hammer.



- (2) As the yoke is tapped, the needle roller bearing will come out gradually, permitting easy removal by hand.



INSPECTION AND REPAIR

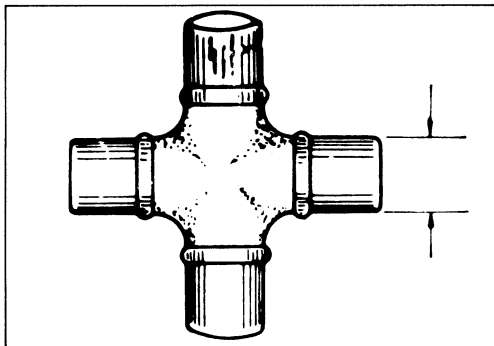
Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

Spider
Needle roller bearing
Yoke
Flange
Center bearing
Cushioning rubber
Bracket



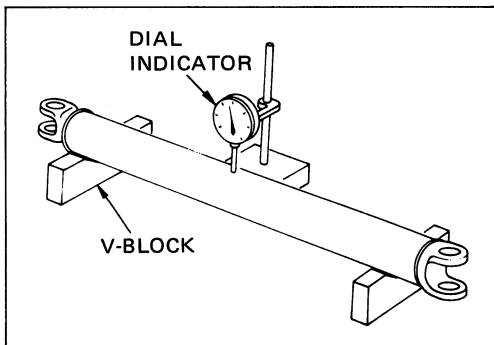
Visual check

Inspect following parts for wear, damage, or other abnormal conditions.



Outside diameter of spider pins

mm(in.)	
Standard	Limit
14.724 (0.56)	14.58 (0.574)

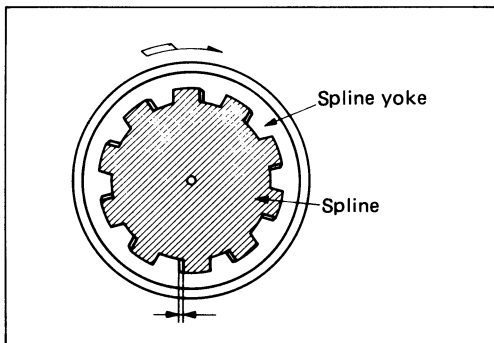


Propeller shaft run-out

Support the ends of the propeller shaft on V-blocks and check for run-out by holding the probe of a dial indicator in contact with the center part of the shaft.

If the amount of run-out is beyond the standard value for assembly, correct with a bench press or replace the shaft with a new one.

mm(in.)	
Standard	Limit
0.3 (0.012)	0.5 (0.02)



Play in the splines in the normal direction of rotation

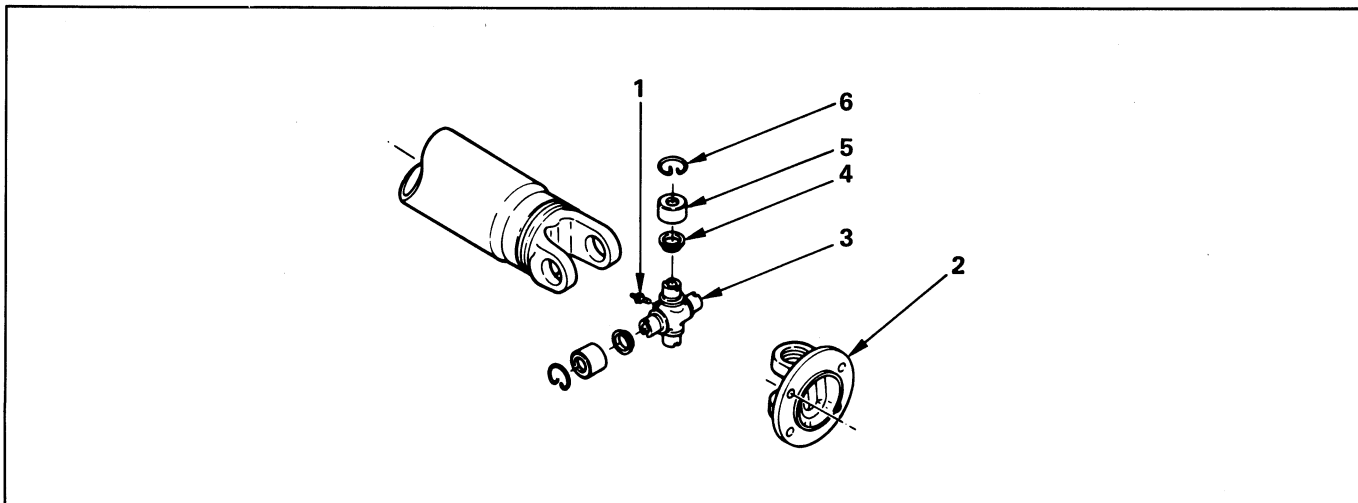
Check the amount of play in the sleeve yoke and the propeller shaft splines in the direction of rotation using a pointed feeler gauge.

mm(in.)	
Standard	Limit
0.06 — 0.14 (0.002 — 0.006)	0.3 (0.012)



REASSEMBLY

UNIVERSAL JOINT

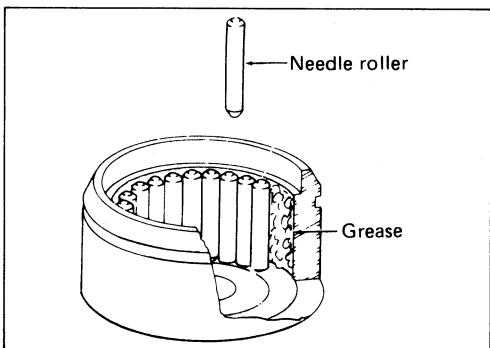


- 1. Grease fitting
- 2. Flange yoke
- 3. Spider

- 4. Seal
- ▲ 5. Needle roller bearing
- ▲ 6. Snap ring

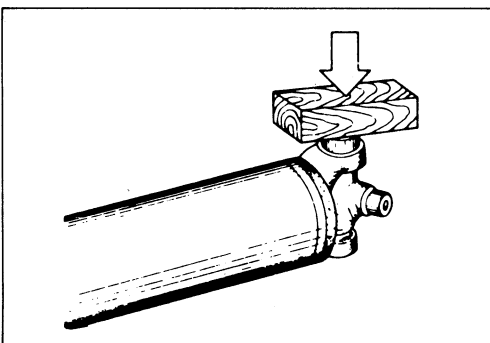


Important operations



5. Needle roller bearing

- (1) Apply a molybdenum-disulfide grease or multipurpose type grease NLGI No. 2 to the bearing cap inner surface. Install the needle rollers.



- (2) Attach the spider to the yoke and then insert the needle roller bearing cap into the hole by using a wood block and a hammer or a press.

6. Snap ring

When the bearing cap is in position, select and install a snap ring of suitable thickness so that the end play of the spider pin is held within 0.1 mm. (0.004 in.).

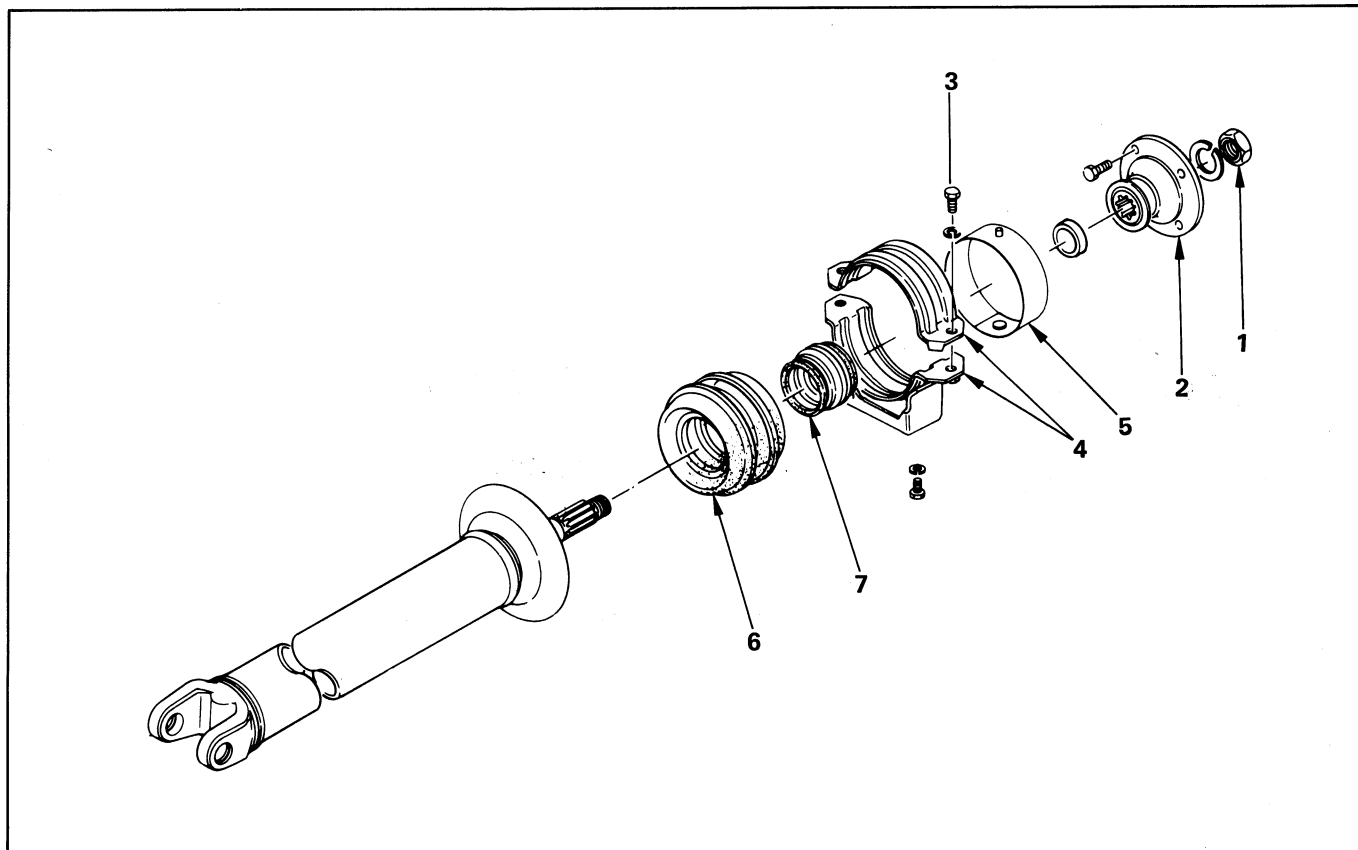
- (1) Install a 1.49 mm (.059 in.) snap ring in the groove at one end.
- (2) Select the thickest snap ring which can be fitted into the groove at the other end.

	mm(in.)
Snap ring thickness	1.44 (0.057)
	1.49 (0.059)
	1.59 (0.063)



DISASSEMBLY AND REASSEMBLY

CENTER BEARING



Disassembly steps

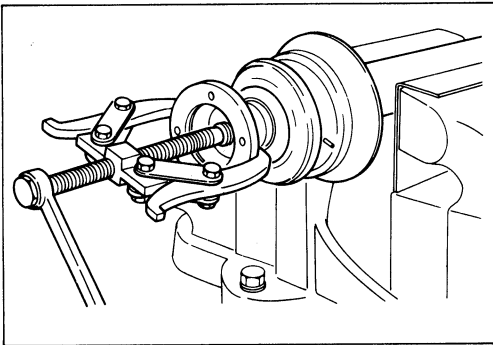
1. Lock nut
- ▲ 2. Flange
3. Bolt
4. Retainer
5. Support ring
6. Cushion rubber
- ▲ 7. Bearing assembly

Reassembly steps

- ▲ 7. Bearing assembly
6. Cushion rubber
- ▲ 5. Support ring
4. Retainer
- ▲ 3. Bolt
- ▲ 2. Flange
- ▲ 1. Lock nut

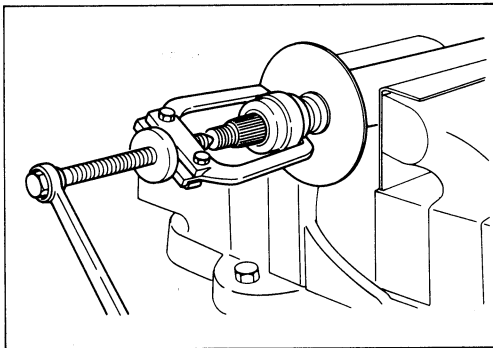


Important operations — Disassembly



2. Flange

Use a suitable remover.

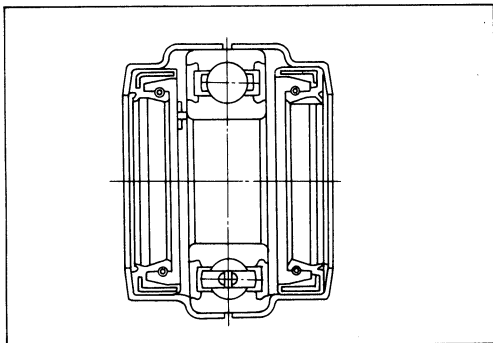


7. Bearing assembly

Use a suitable remover.



Important operations — Reassembly



7. Bearing assembly

Clean the bearing fitting face.



Repack the grease.

Amount of grease required g(oz)	Approx. 12 (0.42)
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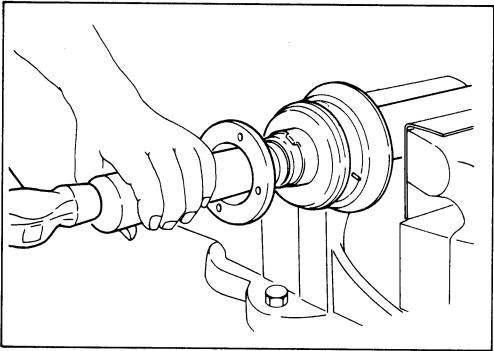
5. Support ring

Align the pin on the support ring with the hole in the rubber cushion.

3. Bolt

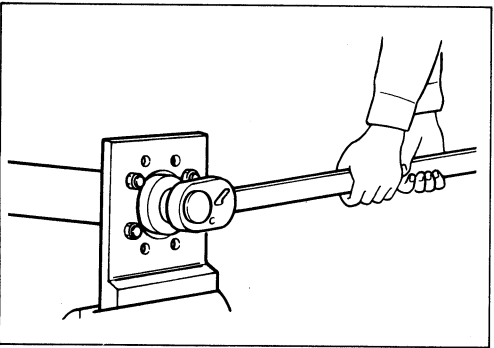


Torque	kg-m(ft.lbs.)	1.2 — 1.6 (8.7 — 11.6)
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2. Flange

Installer : J-6403-6



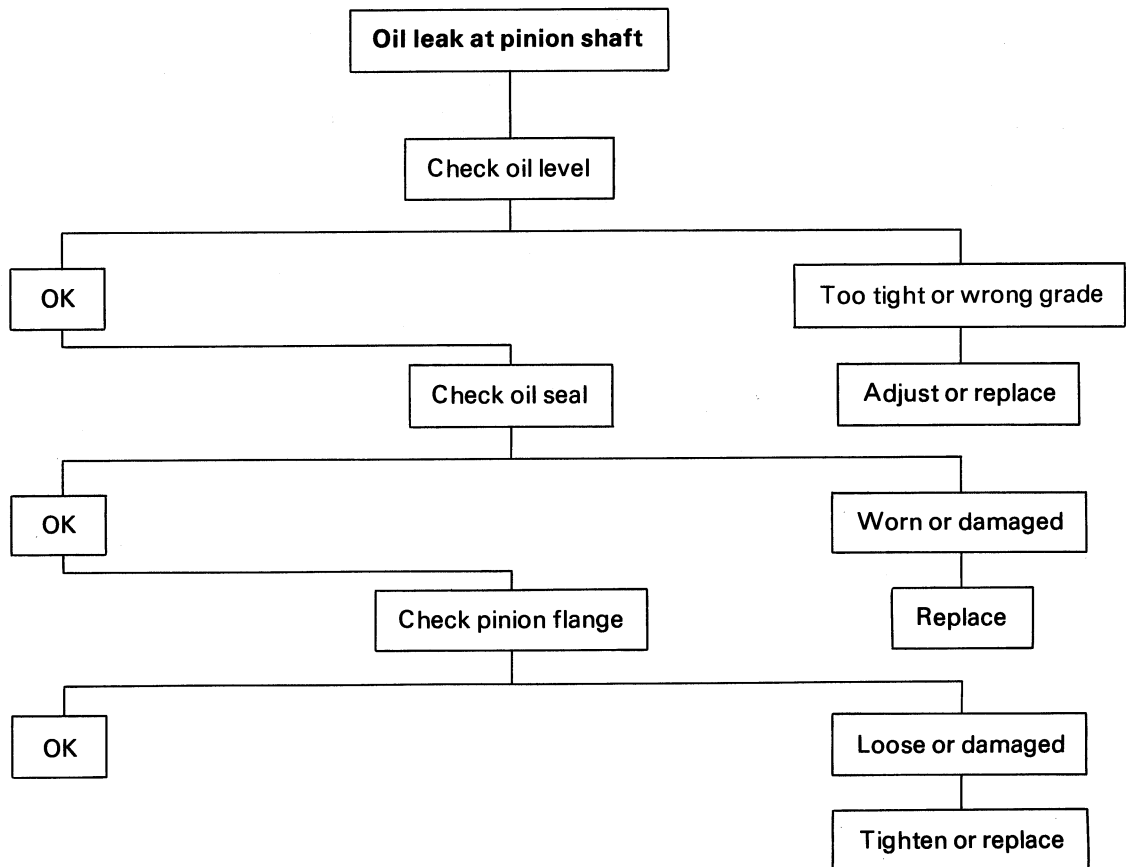
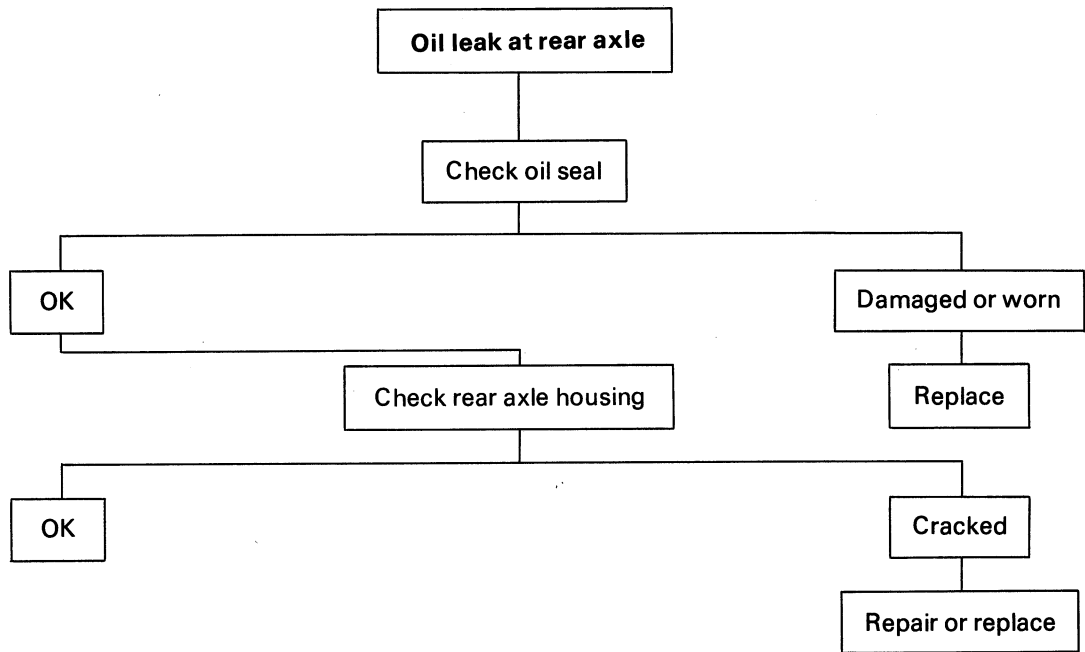
1. Lock nut

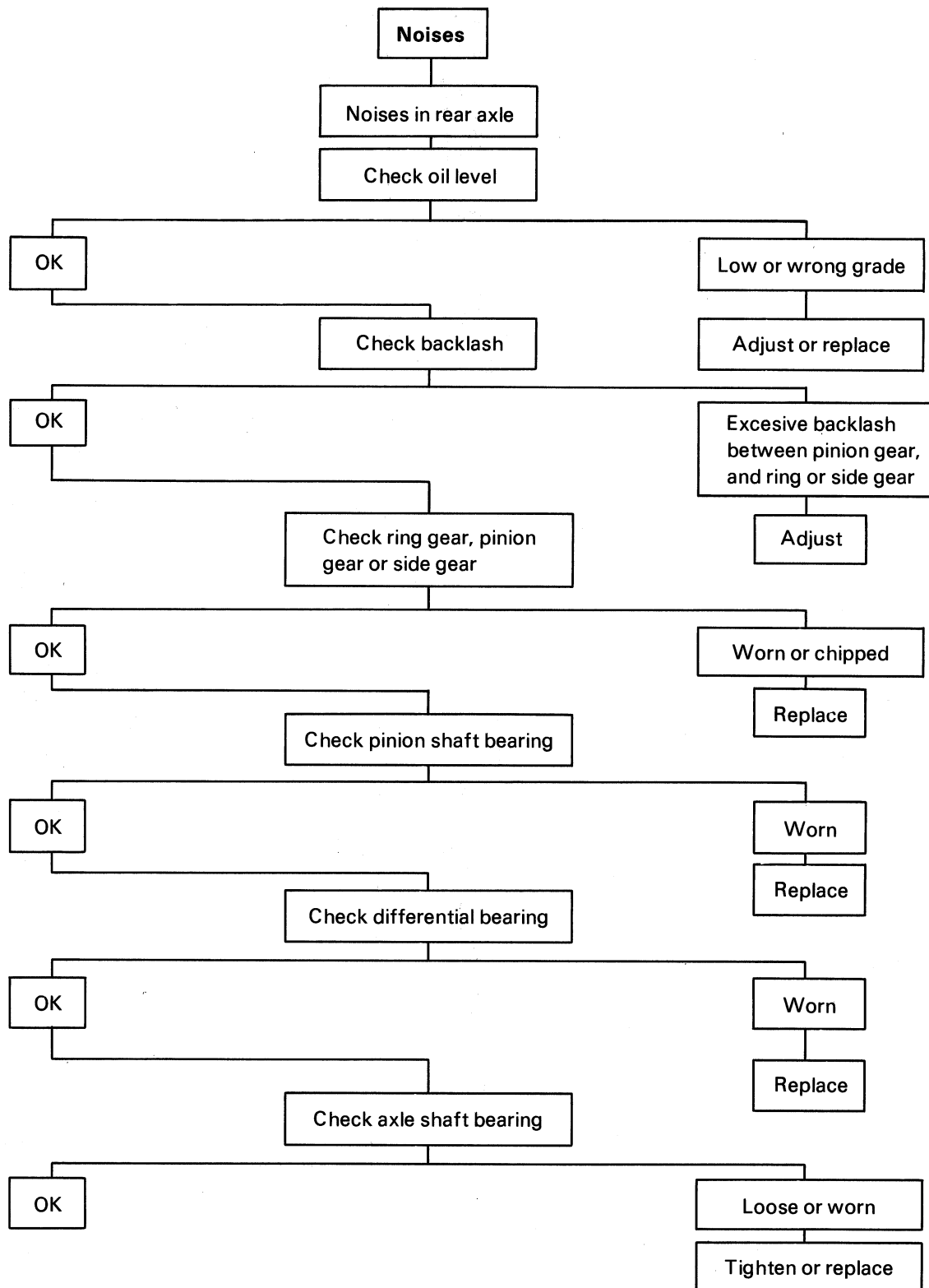
Torque	kg-m(ft.lbs.)	11.5 — 12.5 (83 — 90)
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Stake the outer face of the flange nut against the slot in the shaft.

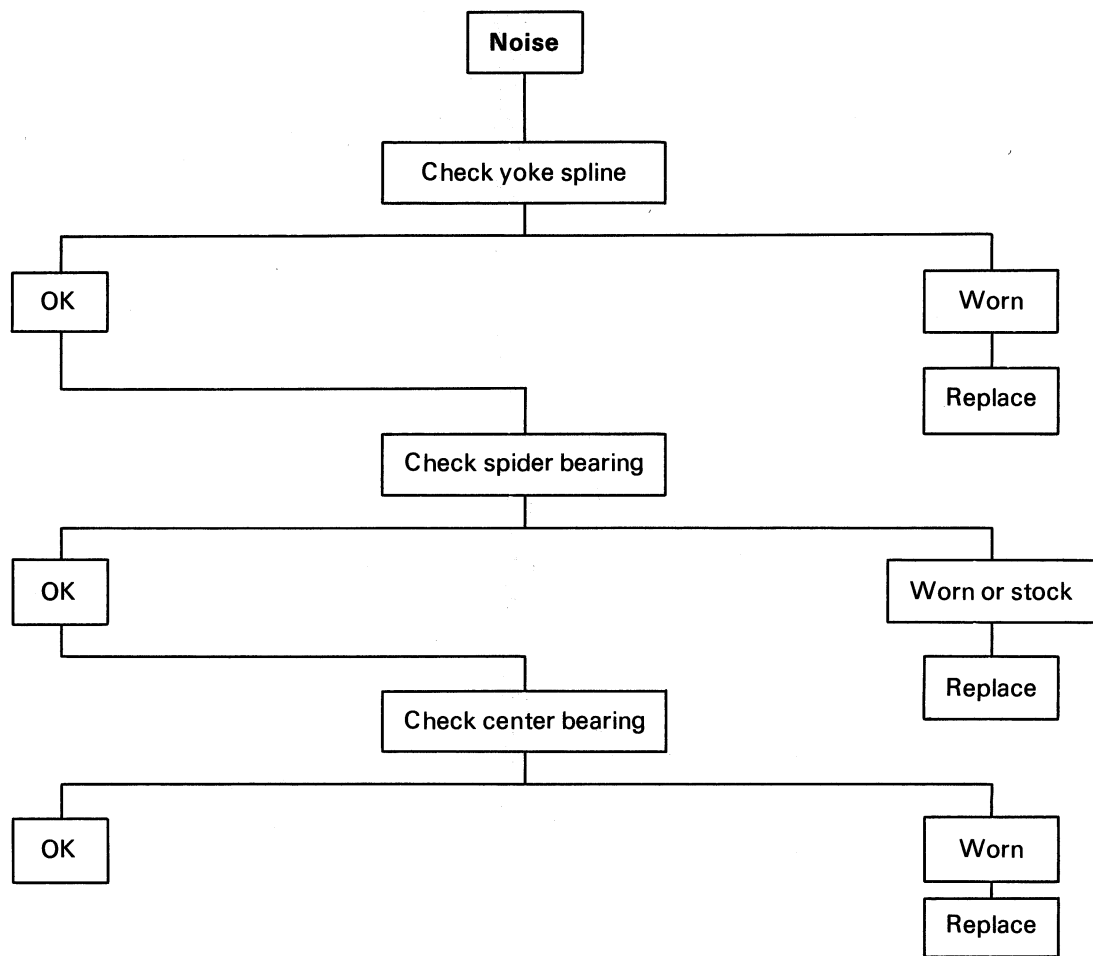
DIAGNOSIS

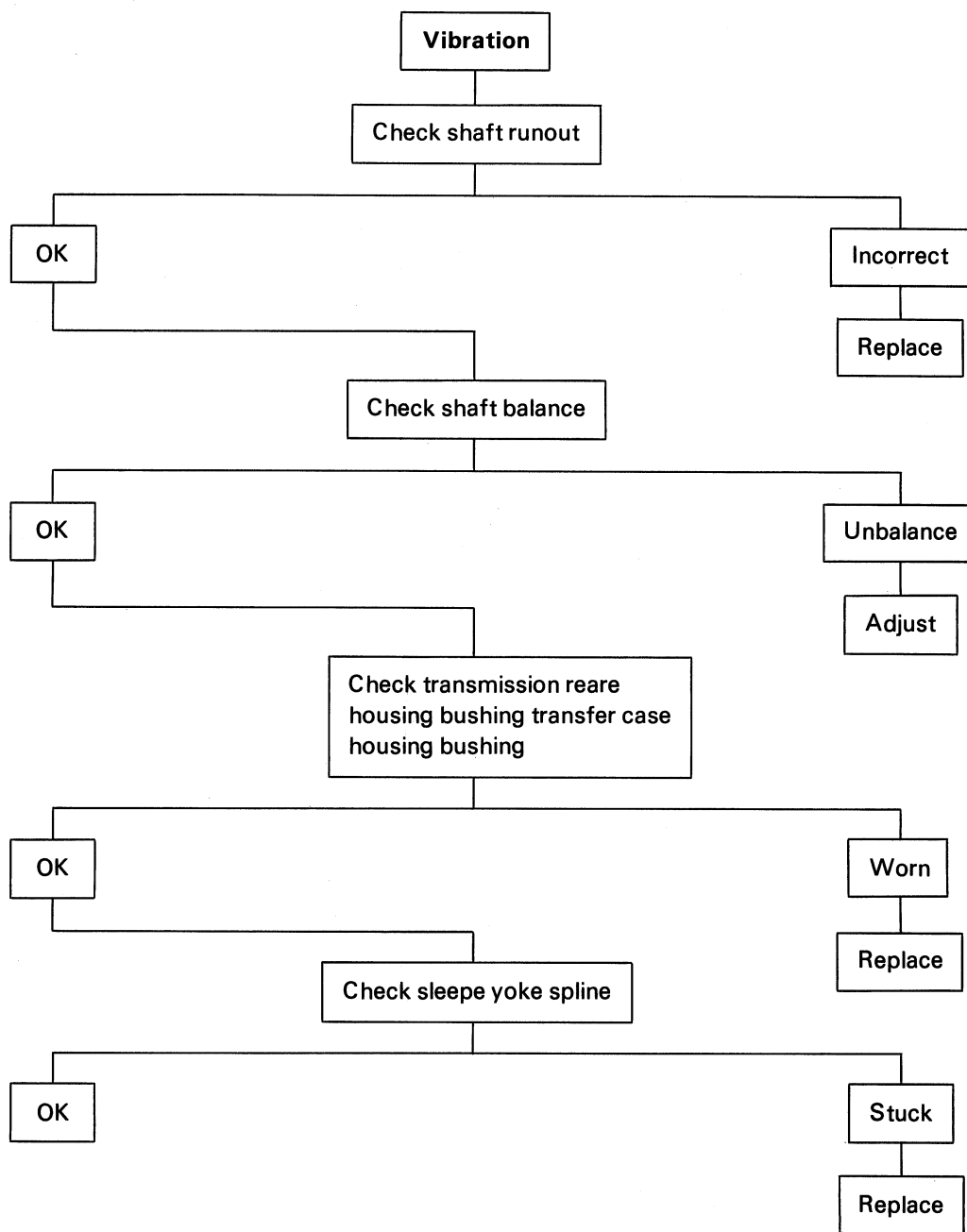
REAR AXLE



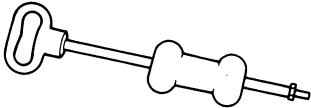
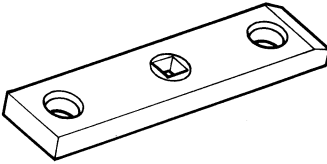
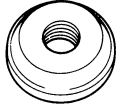
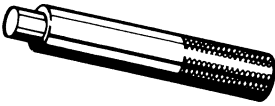
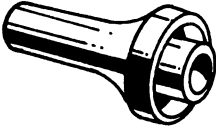
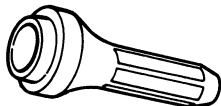


PROPELLER SHAFT

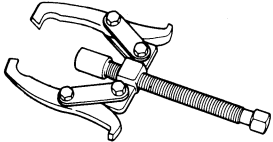
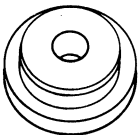
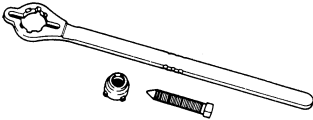
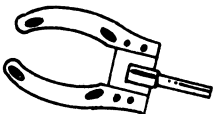
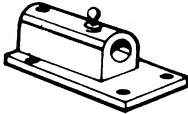
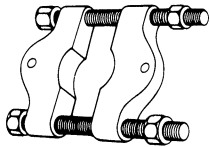
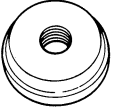
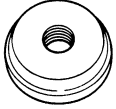


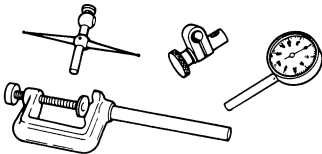
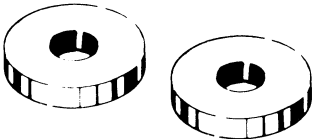
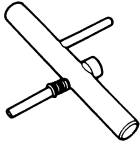
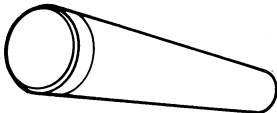
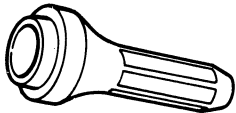
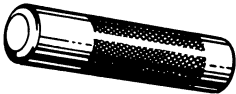
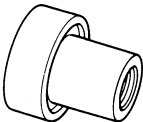


SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-2619-01	Slide hammer 5/8-18 & 1/2-13
		J-21579	Axle shaft bearing plate puller (Use with J-2619-01 slide hammer)
		J-24246	Axle shaft remover
		J-6627-A	Wheel pin remover
		J-24259	Axle shaft bearing outer race installer
		J-8092	Driver handle
		J-24255	Axle shaft bearing holder seal installer
		J-24254	Axle shaft oil seal installer
		J-8609-01	Axle bearing shield installer

07A-50 REAR AXLE AND REAR PROPELLER SHAFT

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-22888	Side bearing puller
		J-8107-2	Side bearing plug puller adapter (Use with J-22888 Puller)
		J-8614-01	Pinion flange holder
		J-21533	Differential holding fixture (Use with J-3289-20 base)
		J-3289-20	Holding fixture base For use with J-3289-20
		J-22912-01	Rear pinion bearing remover axle shaft bearing remover
		J-24256	Front pinion bearing race installer
		J-24252	Rear pinion bearing race installer
		J-21777-42	Pilot

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-23597-9	Nut & Bolt
		J-23597-7	Gauge plate
		J-8001	Dial gauge
		J-23597-8	Disc (2 required)
		J-23597-1	Arbor
		J-6133-01	Rear pinion bearing installer
		J-24250	Pinion oil seal installer
		J-6403-C	Pinion flange installer
		J-24244	Side bearing installer

SECTION 07

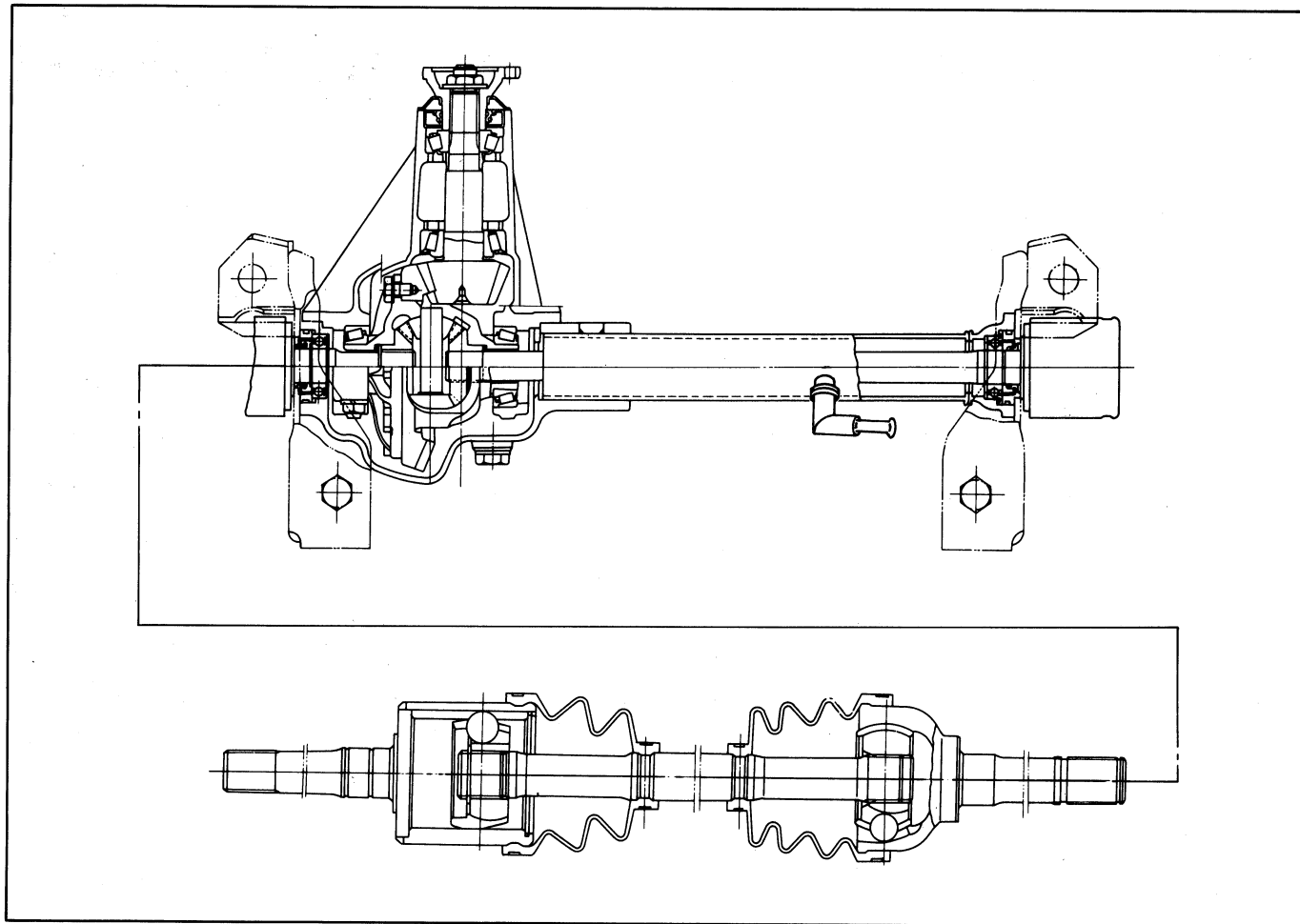
FRONT AXLE AND FRONT PROPELLER SHAFT

INDEX

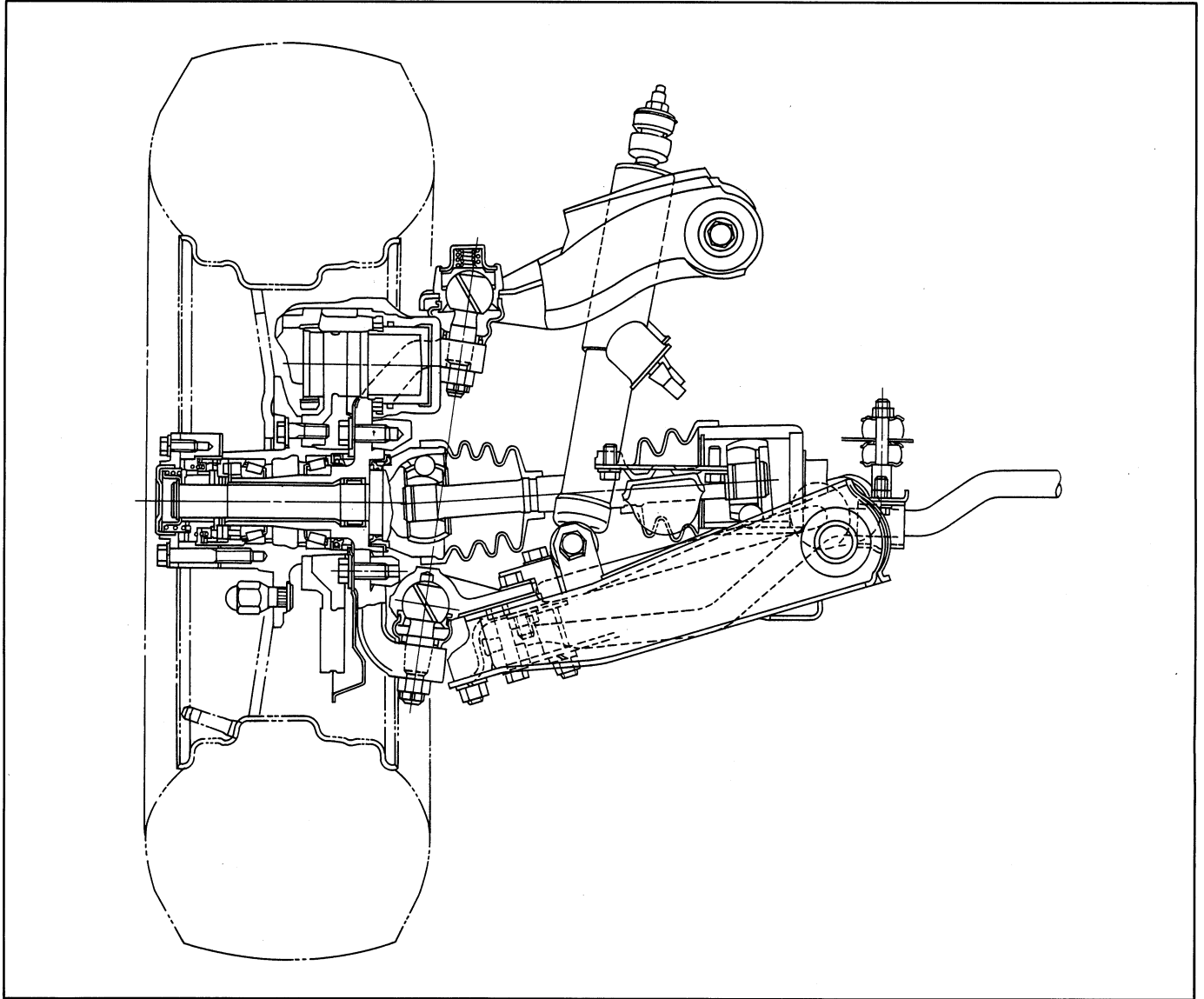
CONTENTS	PAGE
General description	07- 2
Main data and specifications	07- 5
Major parts ; fixing nuts and bolts	07- 6
Front drive axle assembly	07- 9
Front drive axle	07-12
Differential	07-18
Front hub and disc	07-35
Front propeller shaft	07-48
Diagnosis	07-53
Special tools	07-61

GENERAL DESCRIPTION

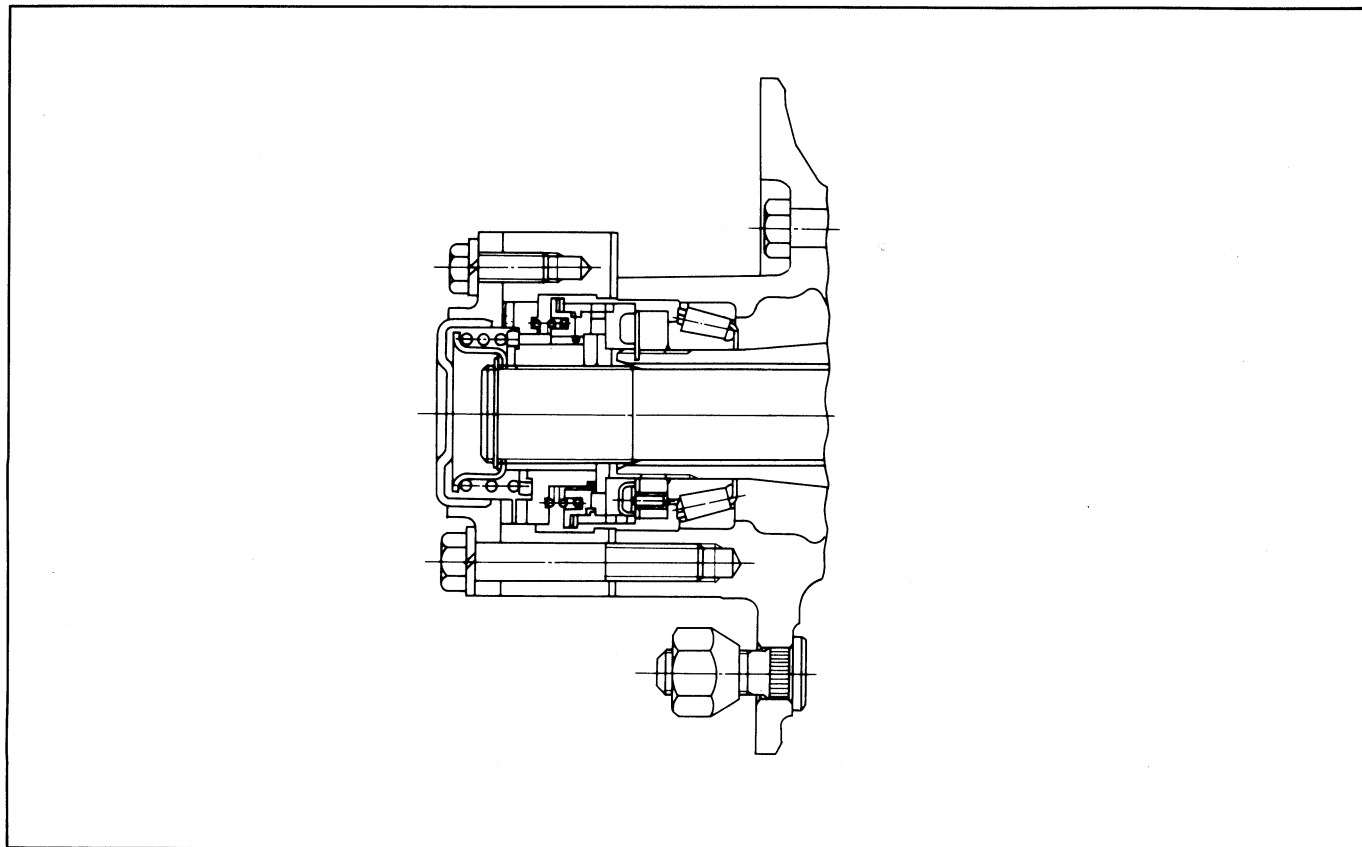
FRONT DRIVE AXLE



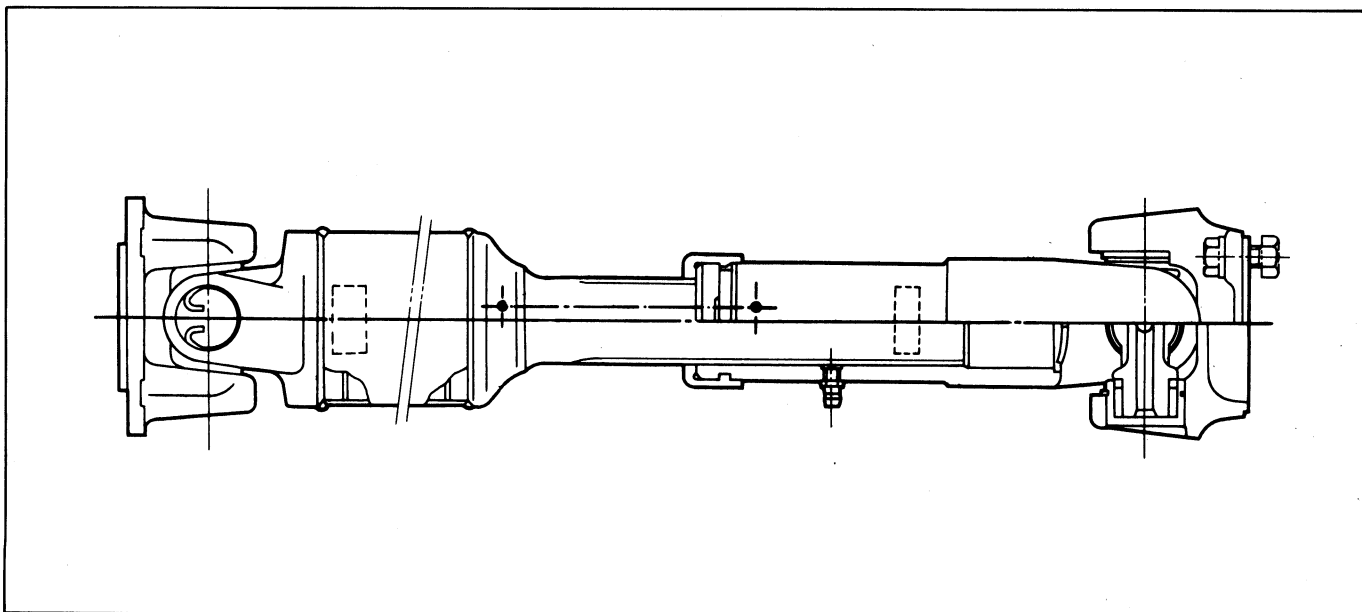
FRONT HUB AND DISC



AUTOMATIC LOCKING HUB



FRONT PROPELLER SHAFT



MAIN DATA AND SPECIFICATIONS

FRONT AXLE AND DIFFERENTIAL

Axle tube			
Type			It consists of the duct, a cast iron housing and the Axle tube.
Gear type			Hypoid
Gear ratio	(to 1)		4.555 (41/9)
Differential type			Two pinion
Oil capacity	liter(gal)		1.0 (0.264)
Axle shaft type			Constant velocity joint (Birfield joint type and double offset joint)
Hub locking			
Type			Automatic locking free wheel hubs

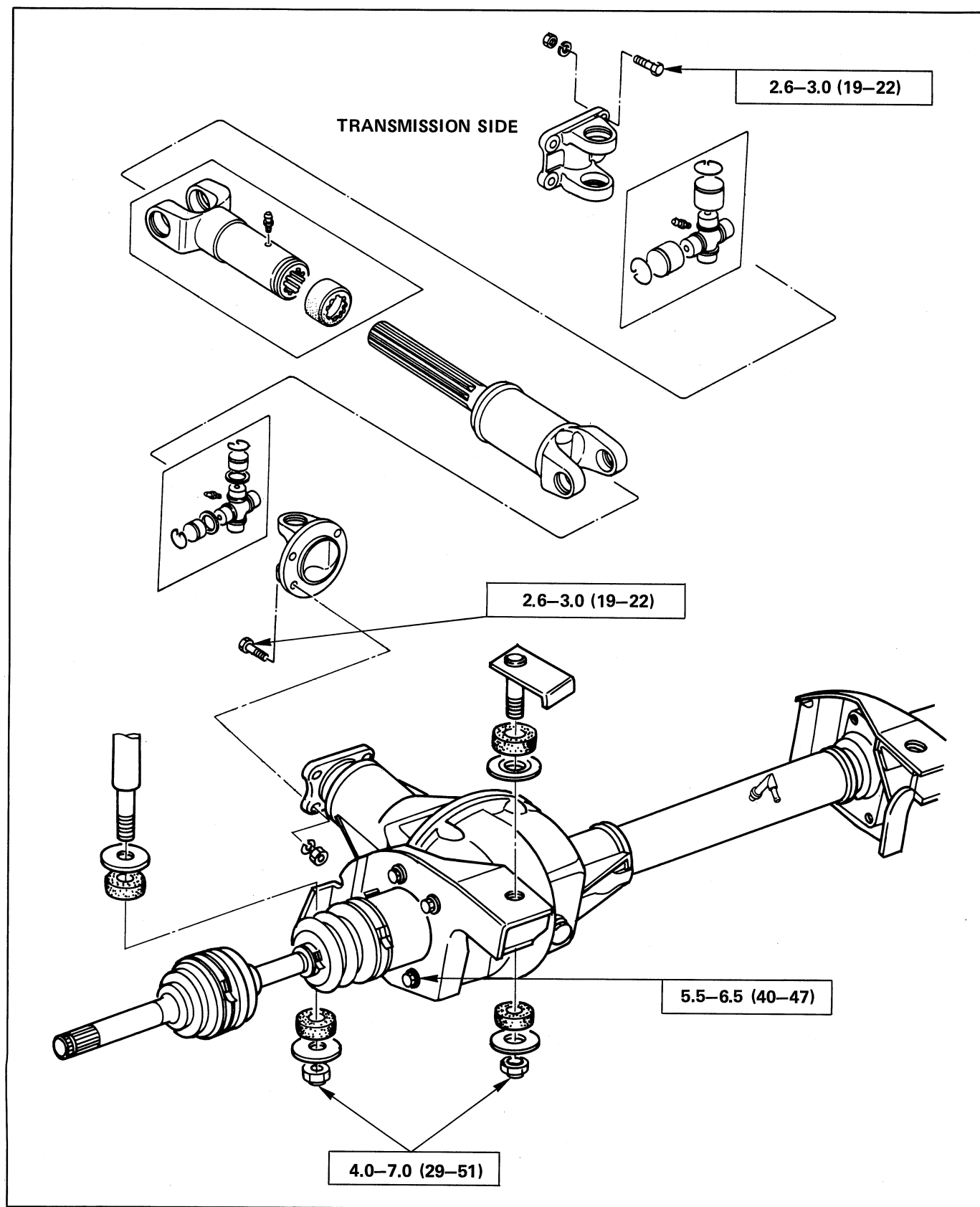
FRONT PROPELLER SHAFT

Outside diameter	mm(in.)		63.5 (2.50)
Inside diameter	mm(in.)		60.3 (2.374)
Length	mm(in.)		423 (16.654)
Univeral joint type			Cardan type

MAJOR PARTS ; FIXING NUTS AND BOLTS

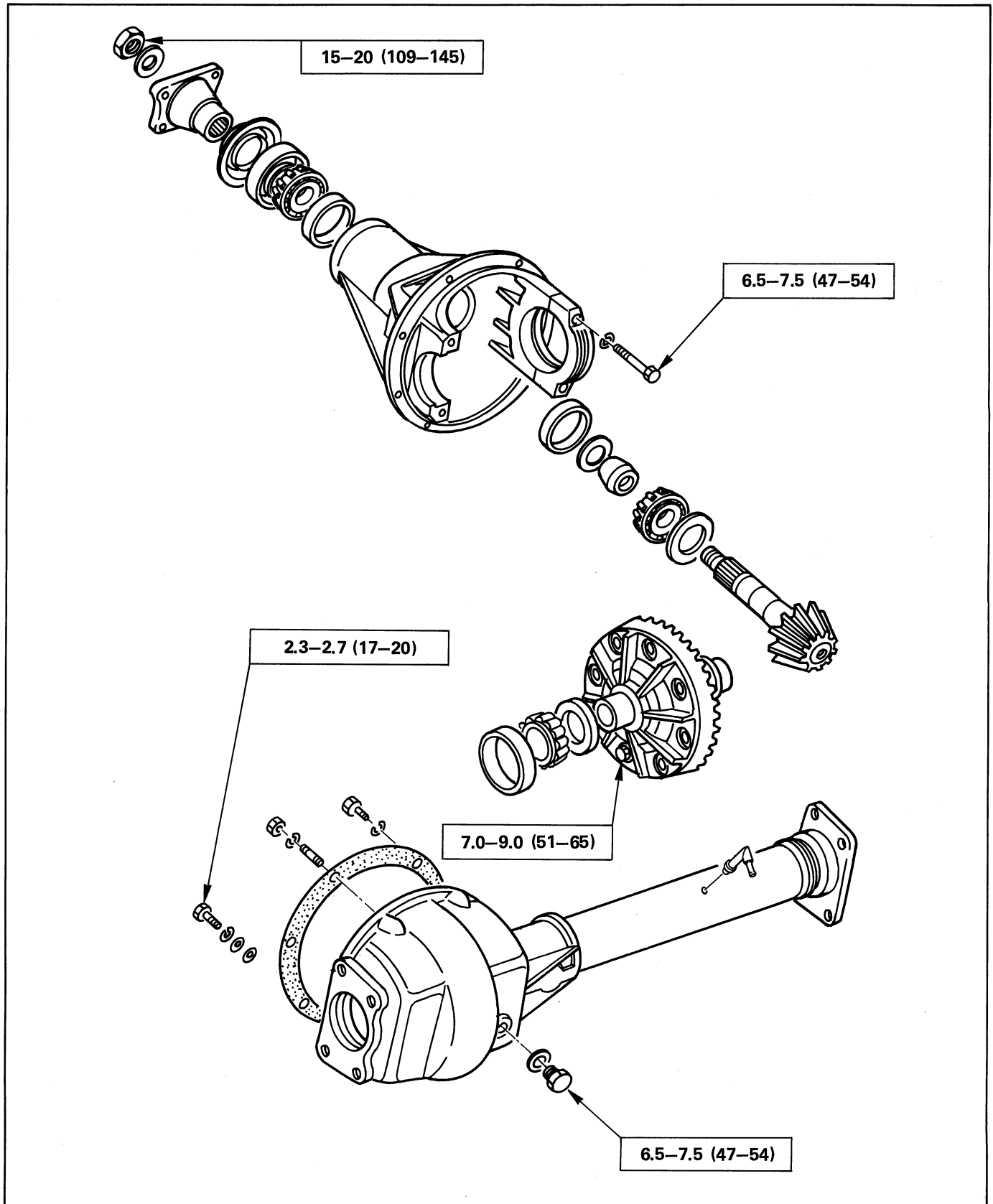
FRONT DRIVE AXLE AND PROPELLER SHAFT

kg-m(ft.lbs.)



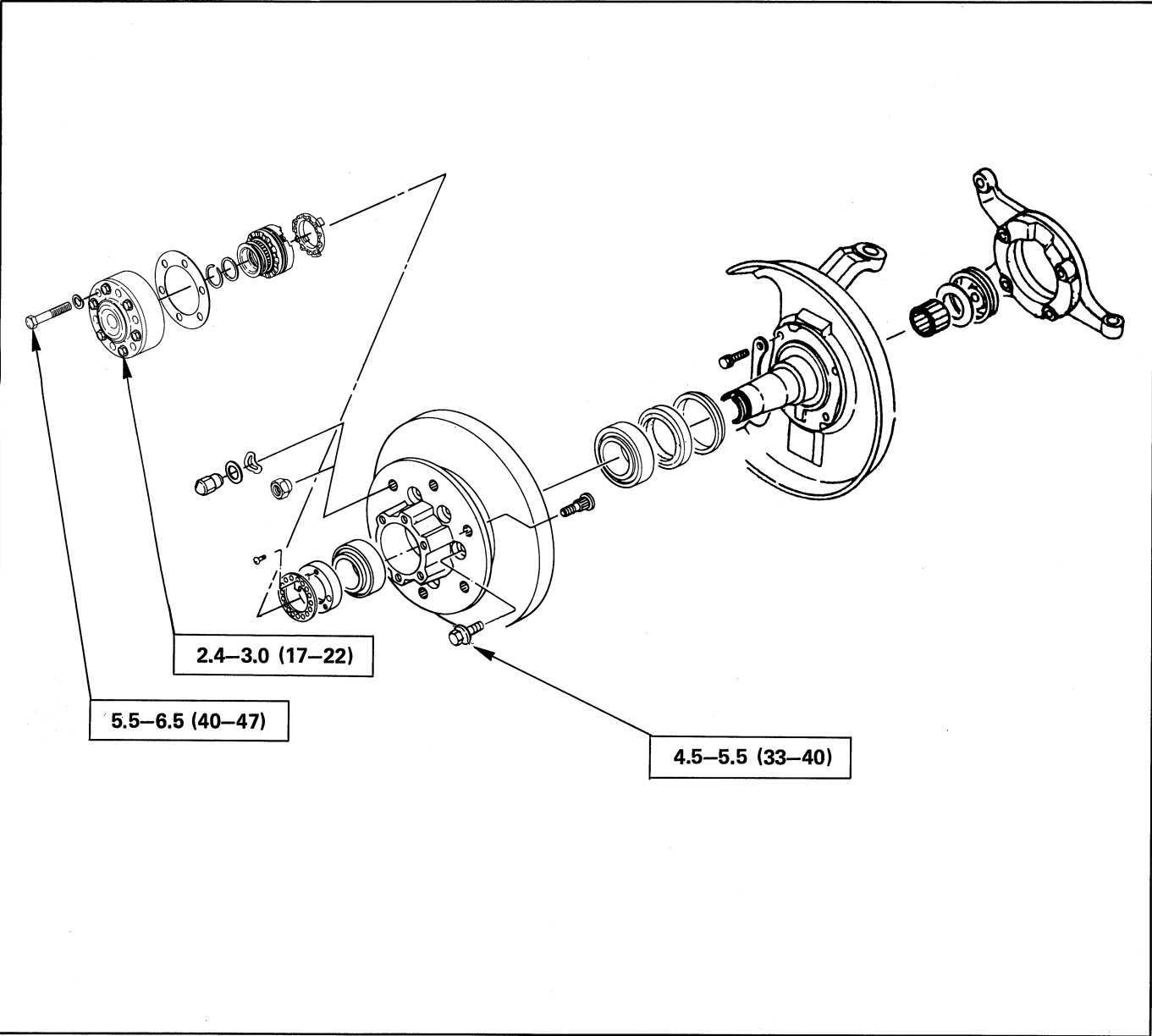
FRONT DIFFERENTIAL

kg-m(ft.lbs.)



AUTOMATIC LOCKING HUB

kg-m(ft.lbs.)

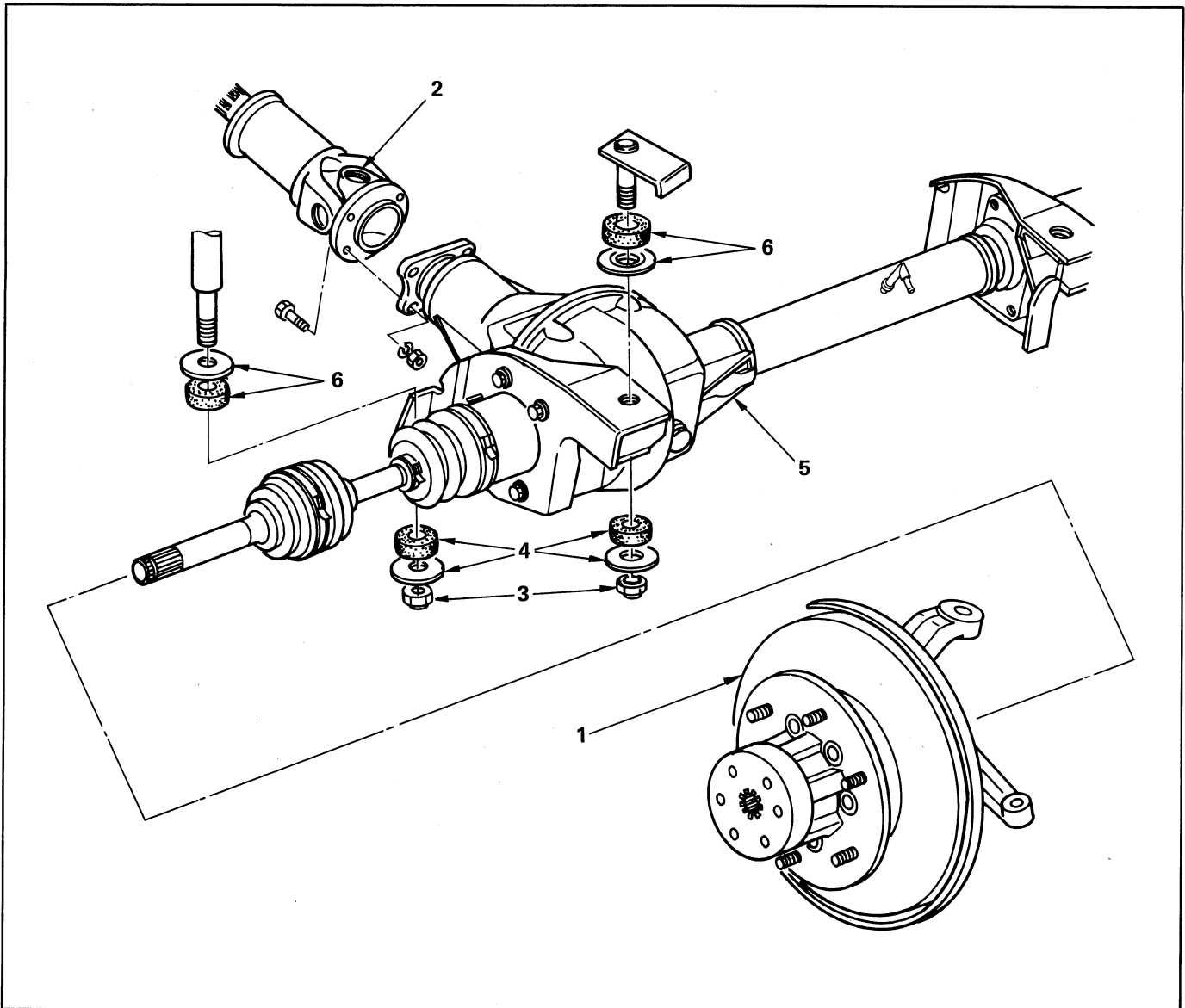


FRONT DRIVE AXLE ASSEMBLY



REMOVAL AND INSTALLATION

1. Refer to SECTION 08 "ROAD WHEEL AND TIRE" for road wheel Disassembly and Reassembly procedure.
2. Refer to SECTION 09 "BRAKE" for disc brake caliper removal and installation procedure.
3. Refer to SECTION 10 "STEERING" for Steering linkage removal and installation procedure.
4. Refer to SECTION 07 "FRONT AXLE AND PROPELLER SHAFT" for Automatic hub disassembly and reassembly procedure.



Removal steps

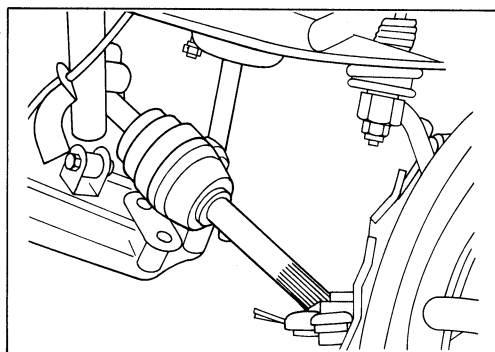
- ▲ 1. Assembly of hub and disc, back plate, knuckle, knuckle arm, and lower end.
- ▲ 2. Propeller shaft
- 3. Nut
- 4. Washer and bushing
- ▲ 5. Front drive axle assembly
- 6. Washer and bushing

Installation steps

- 6. Washer and bushing
- ▲ 5. Front drive axle assembly
- 4. Washer and bushing
- ▲ 3. Nut
- ▲ 2. Propeller shaft
- ▲ 1. Assembly of hub and disc, back plate, knuckle, knuckle arm, and lower end.

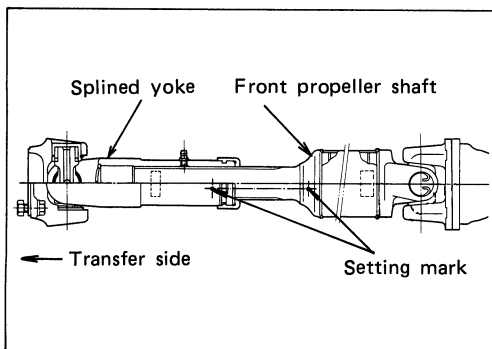


Important operations — Removal



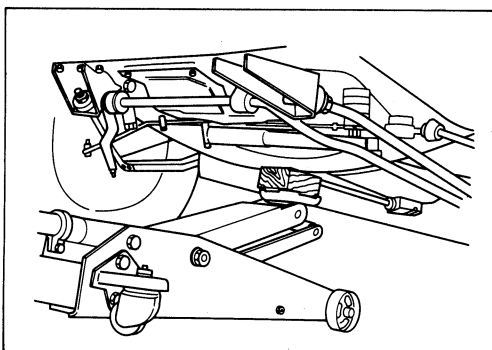
1. Assembly of hub and disc, back plate, knuckle, knuckle arm, and lower end.

Before removal, jack up the front of vehicle and support the frame with jack stands.



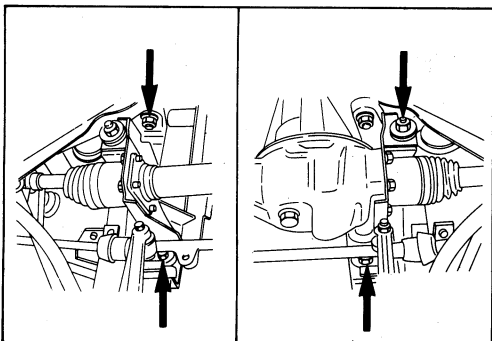
2. Propeller shaft

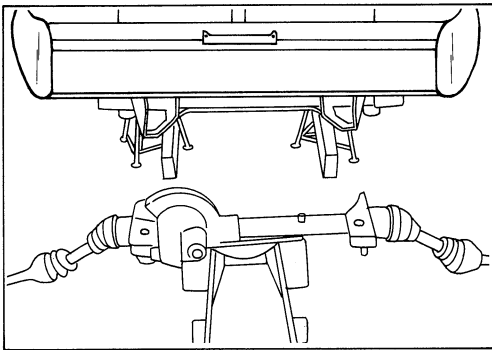
Apply the setting marks.



5. Front drive axle assembly

- (1) Put the lifting jack under the center part of the front axle and remove the four fixing bolts.

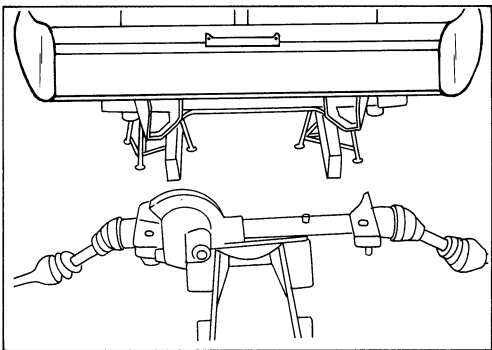




- (2) Lower the front axle assembly and roll it out toward the front of the vehicle.
Take care not to damage to the Birfield joints or the double off-set joints.



Important operations — Installation



5. Front drive axle assembly

Place the front axle assembly in position under the vehicle using a lifting jack.

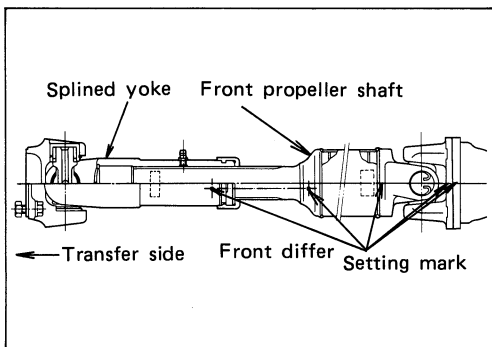
3. Nut

Torque	kg-m(ft.lbs.)	4.0 — 7.0 (29 — 51)
--------	---------------	---------------------

2. Propeller shaft

Align the setting marks applied the removal.

Bolt torque	kg-m(ft.lbs.)	2.6 — 3.0 (19 — 22)
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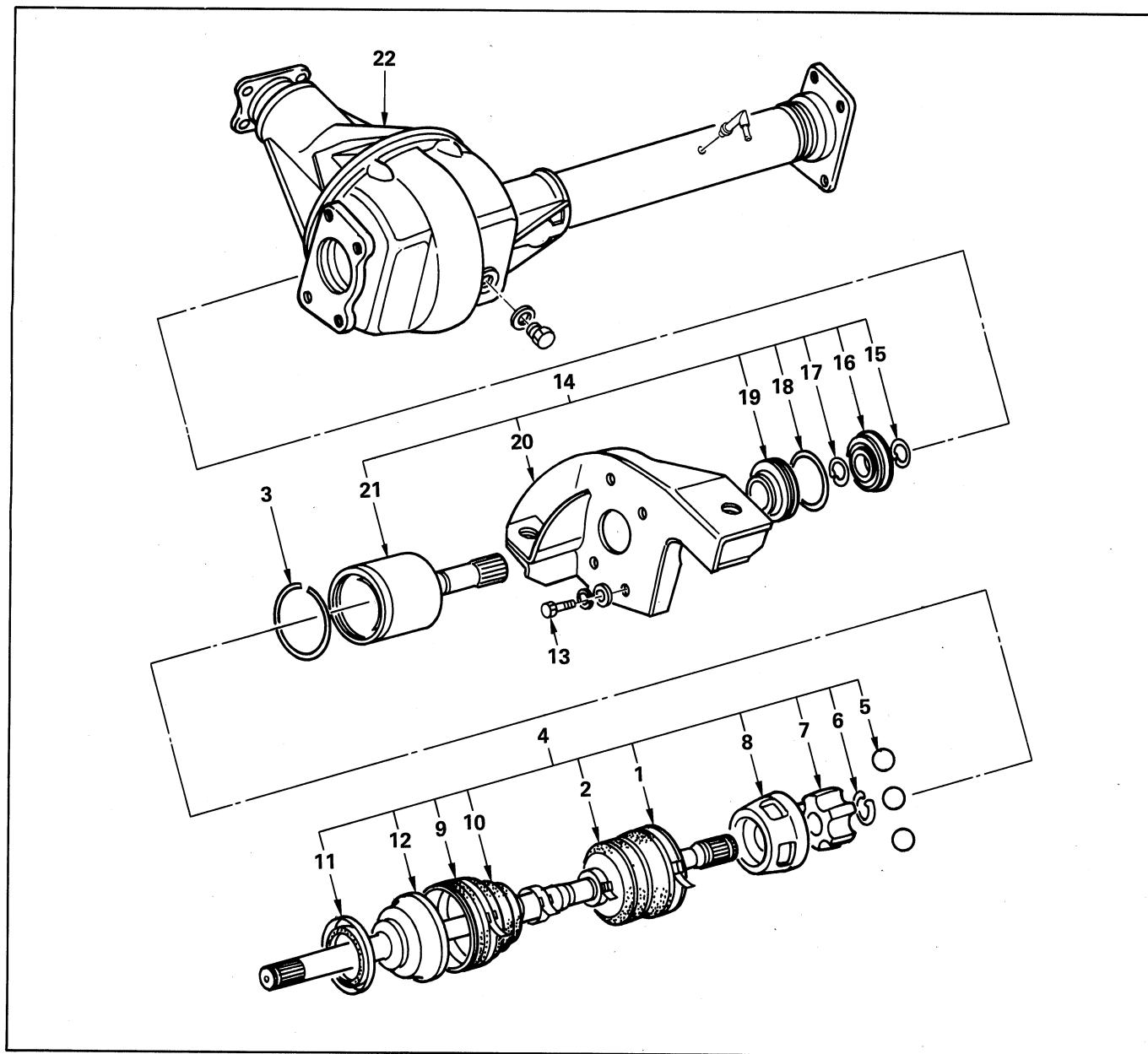


1. Assembly of hub and disc, back plate, knuckle knuckle arm, and lower end

FRONT DRIVE AXLE



DISASSEMBLY



Disassembly steps

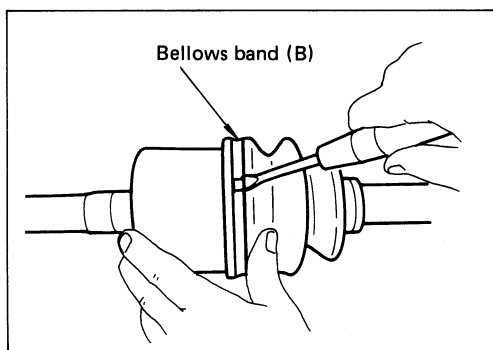
- | | |
|----------------------|--------------------------------|
| ▲ 1. Band | 12. BJ shaft |
| 2. Bellows | 13. Bolt |
| ▲ 3. Circlip | 14. DOJ case assembly |
| 4. BJ shaft assembly | 15. Snap ring |
| ▲ 5. Ball | 16. Bearing |
| ▲ 6. Snap ring | 17. Snap ring |
| 7. Ball retainer | 18. O-ring |
| 8. Ball guide | 19. Oil seal |
| ▲ 9. Band | 20. Bracket |
| 10. Bellows | 21. DOJ case |
| 11. Dust seal | 22. Axle case and differential |



Important operations

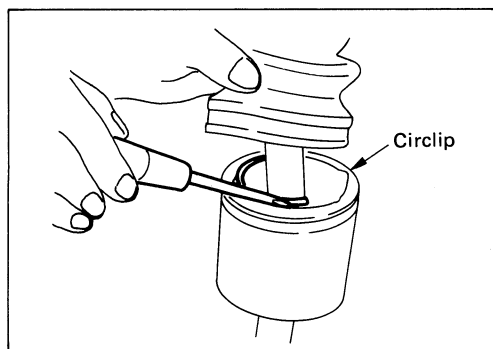
1. Band

Raise the hooked end of the band with a screw driver or equivalent.



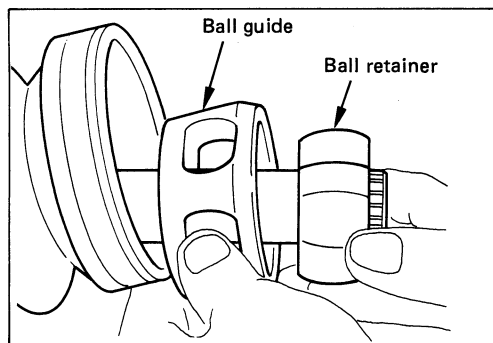
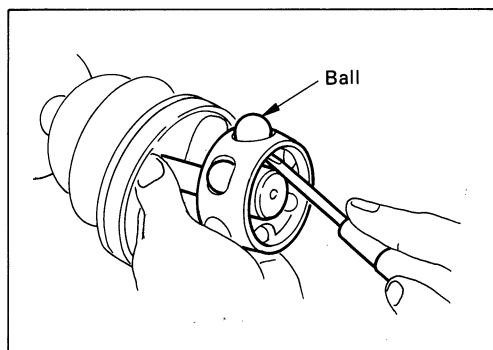
3. Circlip

Pry off with a screw driver or equivalent.



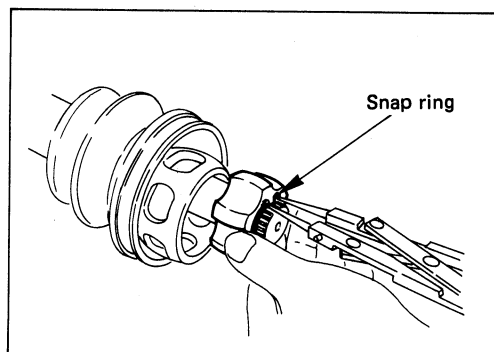
5. Ball

Remove the six balls with a screw driver or equivalent.



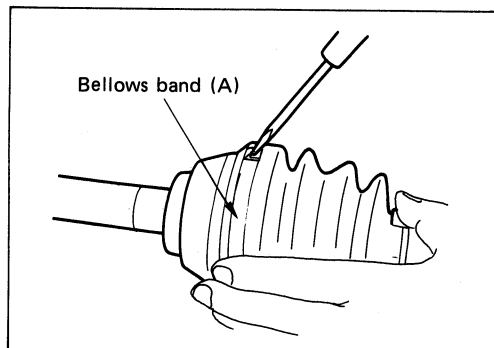
Rotate the case half a pitch to align the ball guide on the case with the projected portion of the ball retainer, then slide the case toward the bellows. The case can not be removed in the reverse direction.

07-14 FRONT AXLE AND FRONT PROPELLER SHAFT



6. Snap ring

Remove the snap ring fastening the ball retainer to the center shaft.



9. Band

Raise the hooked end of the band with a screw driver or equivalent.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- BJ assembly
- DOJ case, ball, ball guide ball retainer
- Bellows
- Bearing
- Dust seal, oil seal

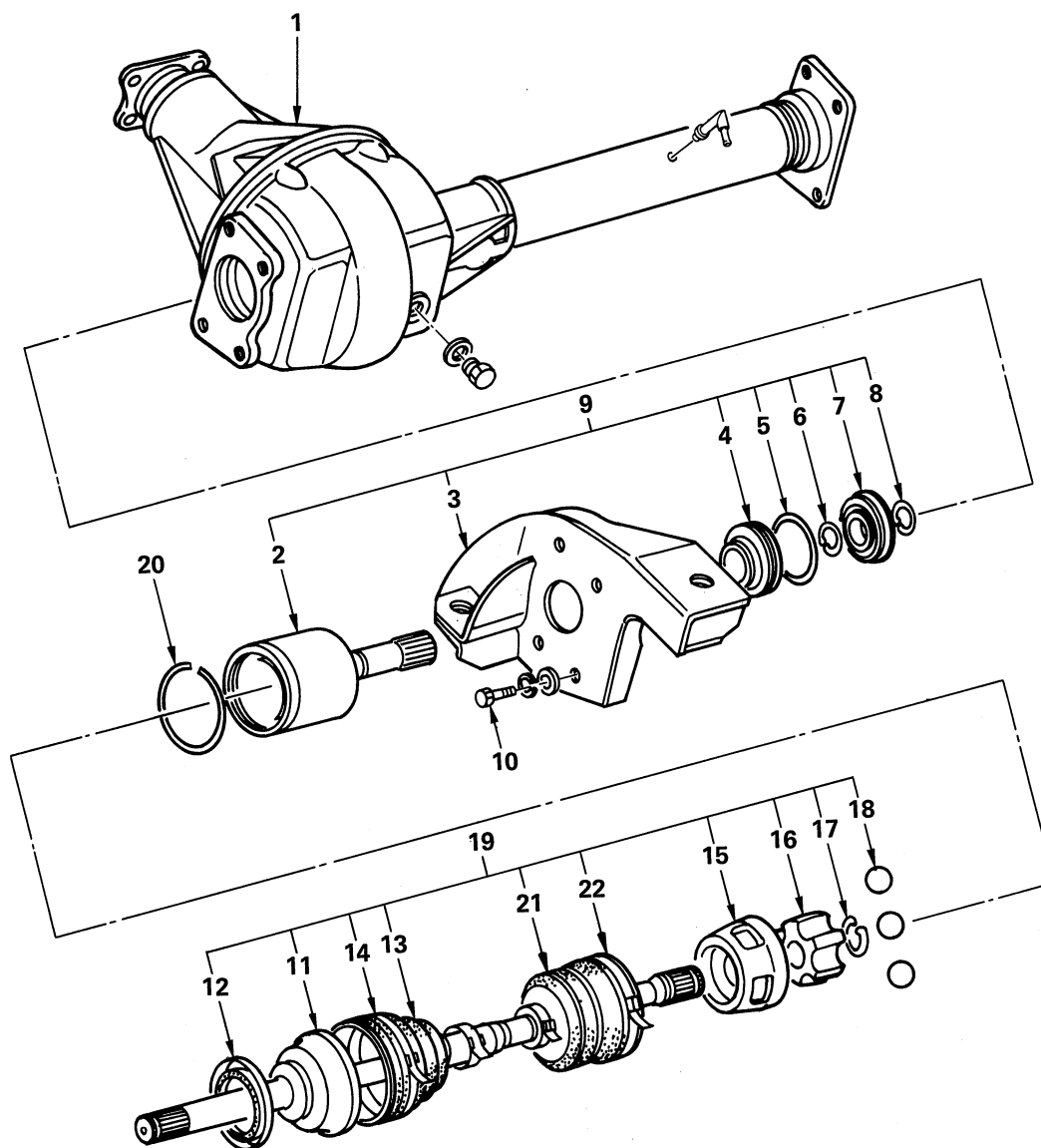


Visual check

Inspect the following parts for wear, damage, or other abnormal conditions.



REASSEMBLY

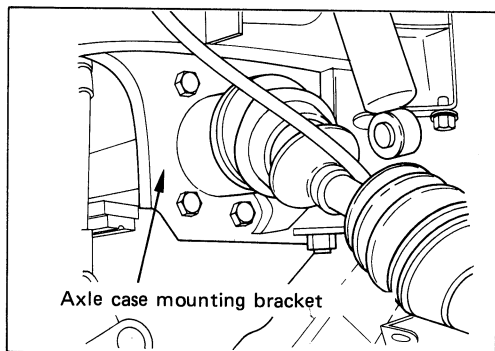


Reassembly steps

- | | |
|-------------------------------|-------------------------|
| 1. Axle case and differential | 12. Dust seal |
| 2. DOJ case | ▲ 13. Bellows |
| 3. Bracket | ▲ 14. Band |
| 4. Oil seal | ▲ 15. Ball guide |
| 5. O-ring | ▲ 16. Ball retainer |
| 6. Snap ring | ▲ 17. Snap ring |
| 7. Bearing | ▲ 18. Ball |
| 8. Snap ring | ▲ 19. BJ shaft assembly |
| 9. DOJ case assembly | ▲ 20. Circlip |
| ▲ 10. Bolt | ▲ 21. Bellows |
| 11. BJ shaft | ▲ 22. Band |



Important operations



10. Bolt

Torque	kg-m(ft.lbs.)	5.5 — 6.5 (40 — 47)
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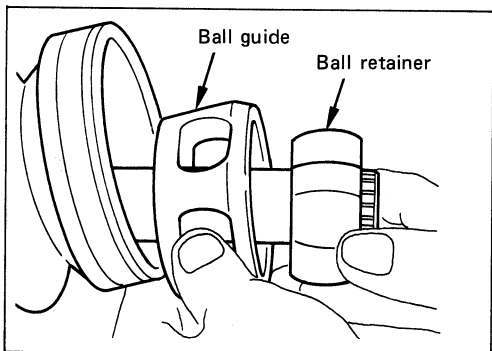
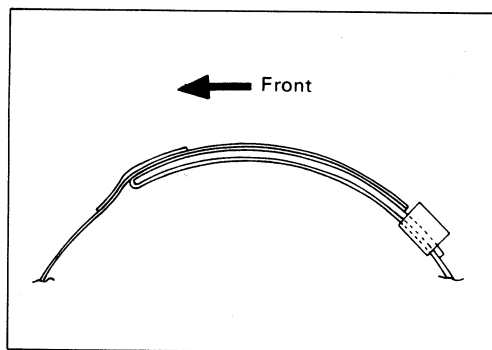
13. Bellows

- (1) Apply a thin coat of grease to the shaft for smooth installation.
- (2) Apply specified grease 1/2 space within the bellows.

14. Band

Note the setting direction.

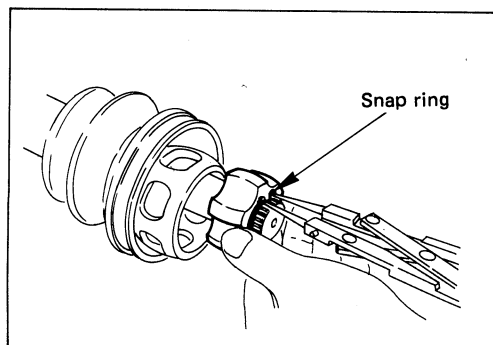
After installation, check that the bellows is free from distortion.



15. Ballguide

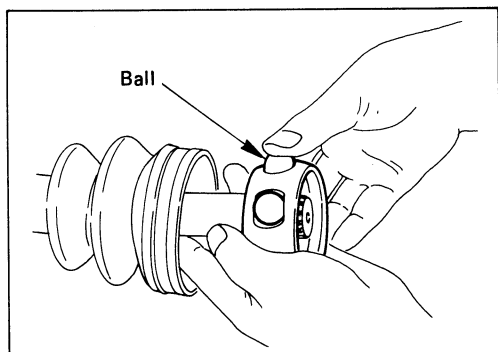
16. Ballretainer

Install the ball guide with the smaller diameter side ahead onto the shaft.



17. Snap ring

Install the snap ring securing the ball retainer to the shaft.



18. Ball

Bring the ball guide of the cage into alignment with the projected portion of the ring on the ball retainer, then turn the cage 1/2 pitch. Align the track on the ball retainer with the window in the cage and install the six balls into position.

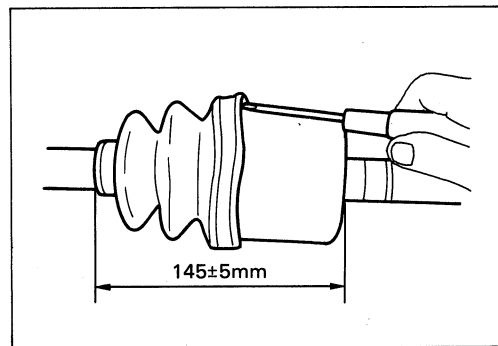
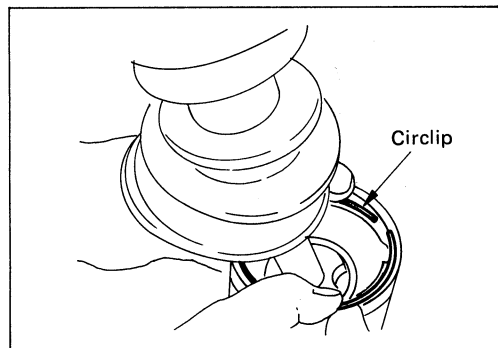
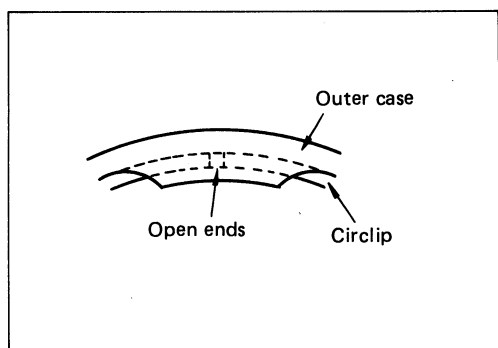


19. BJ shaft assembly

Apply specified grease to half of the space within the DOJ case (Approx. 50g)

20. Circlip

Install the circlip so that open ends are positioned away from the ball groove.



21. Bellows

(1) Before installation, insert the sufficient amount of specified grease into the DOJ case.



(2) Adjust the air pressure within the bellows by inserting a screw driver or equivalent, so that it equals atmospheric pressure.

22. Band

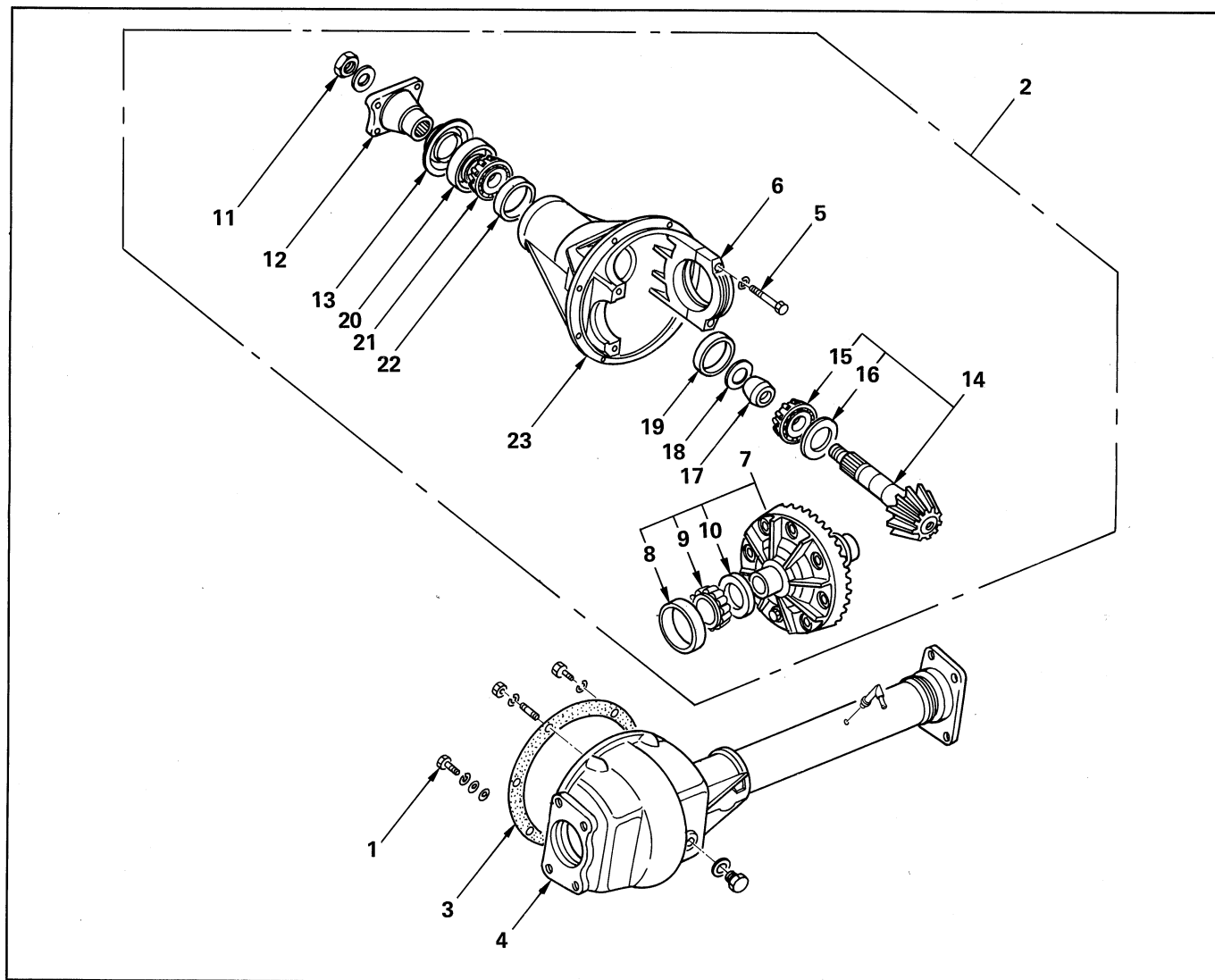
After installation, check that the bellows is free from distortion.

DIFFERENTIAL



DISASSEMBLY

MAJOR COMPONENT

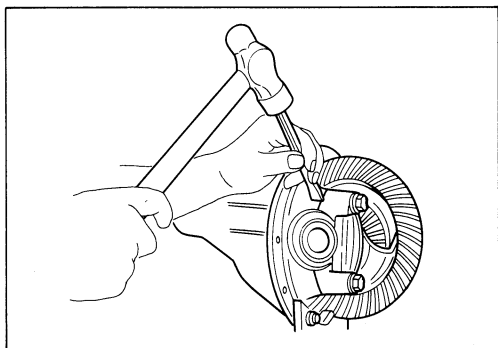


Disassembly steps

- | | |
|------------------------------|----------------------------------|
| 1. Bolt | 13. Dust cover |
| 2. Differential assembly | ▲ 14. Pinion gear |
| 3. Packing | ▲ 15. Inner bearing |
| 4. Axle case | 16. Adjust shim |
| 5. Bolt | 17. Distance piece |
| ▲ 6. Bearing cap | 18. Adjust shim |
| 7. Diff. cage assembly | ▲ 19. Bearing outer race ; inner |
| ▲ 8. Side bearing outer race | 20. Oil seal |
| ▲ 9. Side bearing | 21. Outer bearing |
| ▲ 10. Adjust shims | ▲ 22. Bearing outer race ; outer |
| ▲ 11. Flange nut | 23. Diff. carrier |
| 12. Flange | |

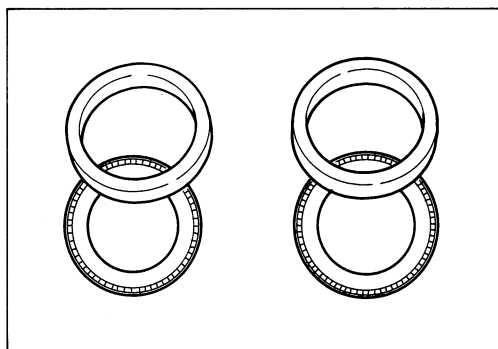


Important operations



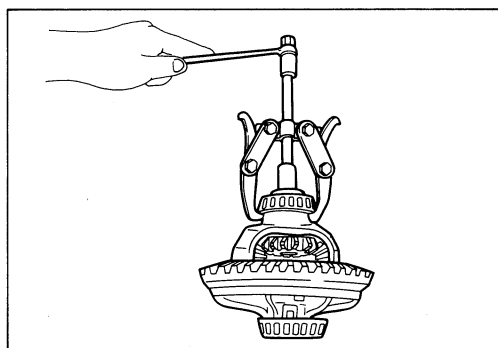
6. Bearing cap

Apply a setting mark to the side bearing cap and the differential carrier.



8. Side bearing outer race

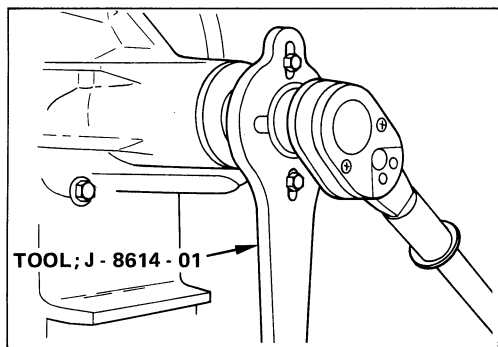
After removal, keep the right and left hand side bearing assemblies separate to maintain inner and outer race combinations.



9. Side bearing inner race

Remover : J-22888

Adapter : J-8107-2



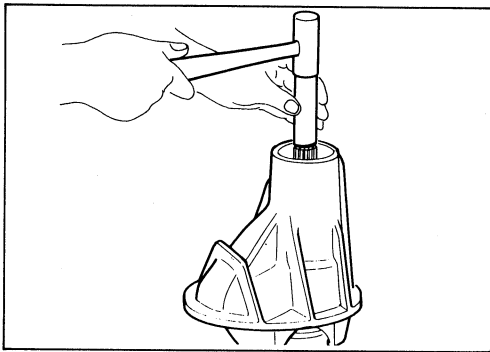
10. Adjust shims

Note the thickness and position of the shims removed.

11. Flange nut

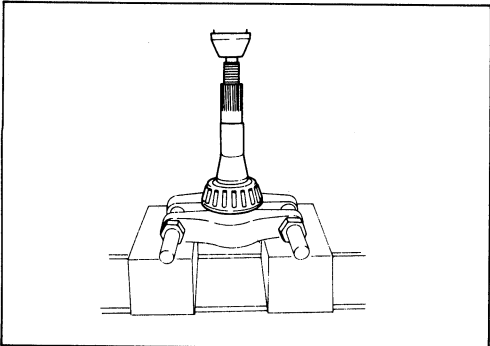
Holding wrench : J-8614-01

07-20 FRONT AXLE AND FRONT PROPELLER SHAFT



14. Pinion gear

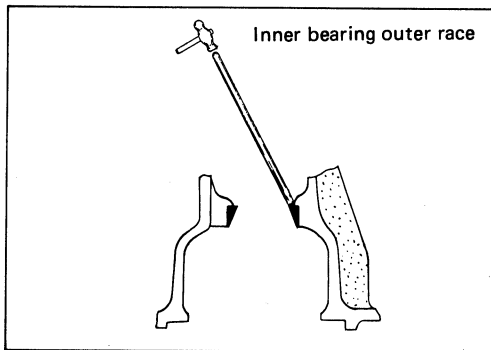
Remove the drive pinion assembly using a soft metal rod and a hammer.



15. Inner bearing

Remove the inner bearing using a separator and a press.

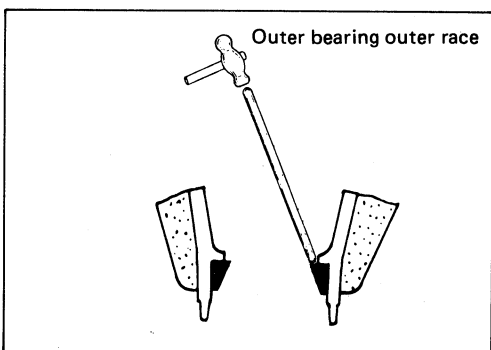
Separator : J-22912-01



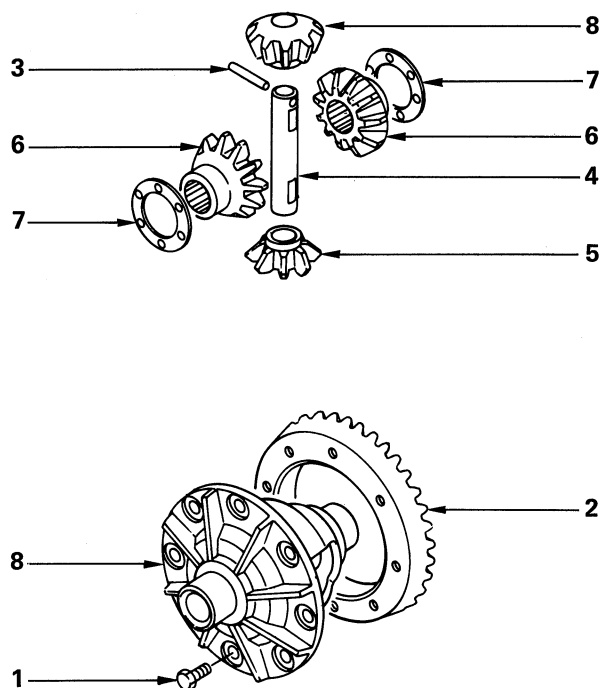
19. Inner bearing outer race

22. Outer bearing outer race

Remove the inner bearing outer race and the outer bearing outer race by using a brass bar and a hammer.



MINOR COMPONENTS



Disassembly steps

- | | |
|----------------|----------------------|
| ▲ 1. Bolt | 5. Pinion gear |
| ▲ 2. Ring gear | 6. Side gear |
| ▲ 3. Lock pin | 7. Thrust washer |
| ▲ 4. Cross pin | 8. Differential cage |



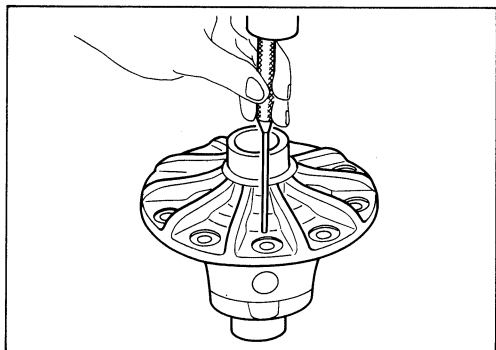
Important operations

1. Bolt

Note that all bolts have a left hand thread.

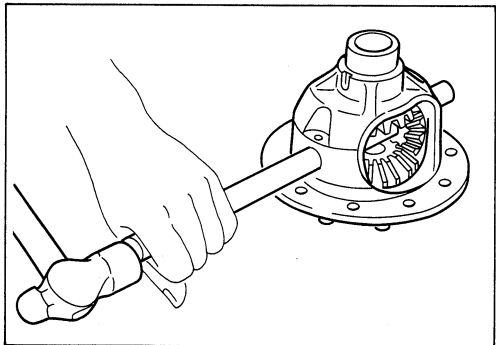
3. Lock pin

Break caulking on the lock pin using a 5 mm (0.20 in.) diameter drill.



4. Cross pin

Remove the cross pin using a soft metal rod and a hammer.



INSPECTION AND REPAIR

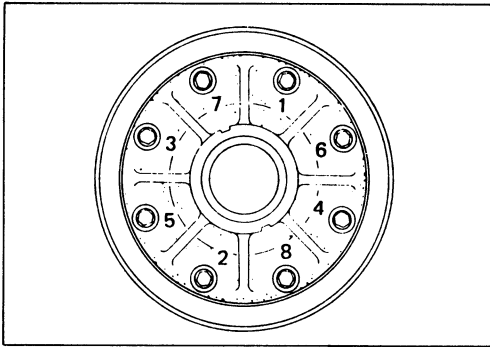
Make all necessary adjustment, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Ring gear, pinion gear
- Bearing
- Side gear, pinion gear, cross pin
- Differential cage, carrier
- Thrust washer
- Oil seal



Visual check

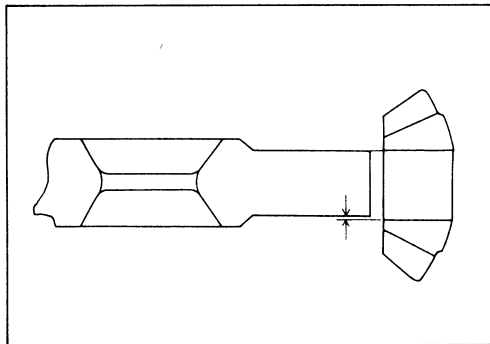
Inspect the following parts for wear, damage, or other abnormal conditions.



Ring gear replacement

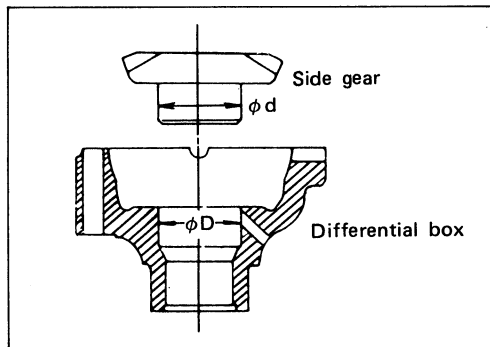
- (1) The ring gear should always be replaced with the drive pinion as a set.
- (2) When installing the ring gear, apply to the threaded holes and bolts after treatment of the bolts with primer N.
- (3) Tighten the fixing bolts in diagonal sequence as illustrated.
- (4) Discard used bolts and install new ones.

Torque	kg-m(ft.lbs.)	7.0 — 9.0 (51 — 65)
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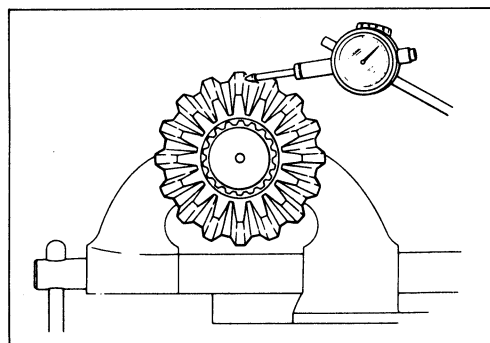
Clearance between the differential pinion and the cross pin

Standard	Limit
0.05 — 0.10 (0.002 — 0.004)	0.2 (0.008)



Clearance between the side gear and the differential cage

Standard	Limit
0.03 — 0.11 (0.001 — 0.004)	0.15 (0.006)



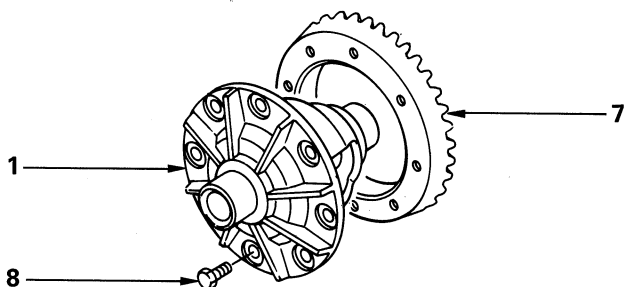
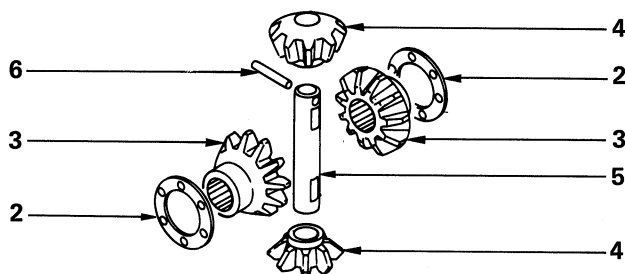
Play in splines between the side gear and the axle shaft

Standard	Limit
0.13 (0.005)	0.3 (0.012)



REASSEMBLY

MINOR COMPONENTS



Reassembly steps

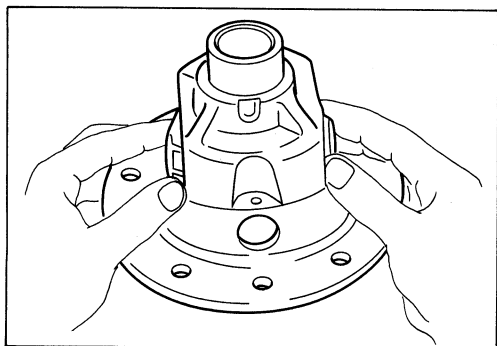
- | | |
|----------------------|----------------|
| 1. Differential cage | ▲ 5. Cross pin |
| 2. Thrust washer | ▲ 6. Lock pin |
| 3. Side gear | ▲ 7. Ring gear |
| ▲ 4. Pinion gear | ▲ 8. Bolt |

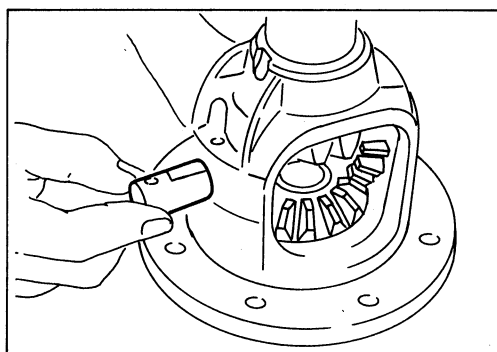


Important operations

4. Pinion gear

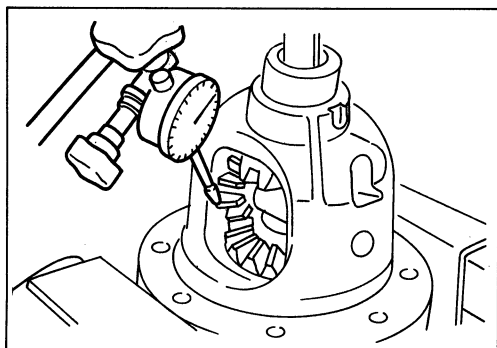
Install the pinion gear by engaging it with the side gears while turning both pinion gears simultaneously in the same direction.





5. Cross pin

- (1) Be sure to install the cross pin so that it is in alignment with the lock pin hole in the differential cage.

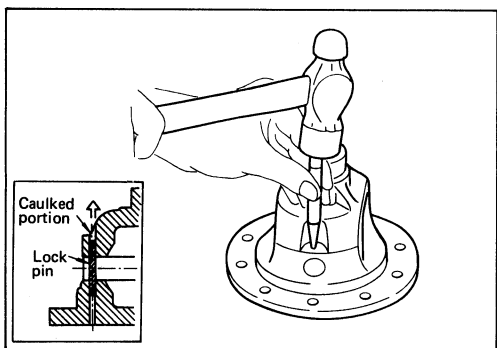


- (2) Adjust the backlash between the side gear and the pinion gear

Backlash	mm(in.)	0.03 — 0.08 (0.001 — 0.003)
----------	---------	-----------------------------

Thickness of thrust washers available

	mm(in.)
	1.05, 1.15, 1.25 (0.041, 0.045, 0.049)



6. Lock pin

After lock pin installation, caulk the cage to prevent discharge of the lock pin.

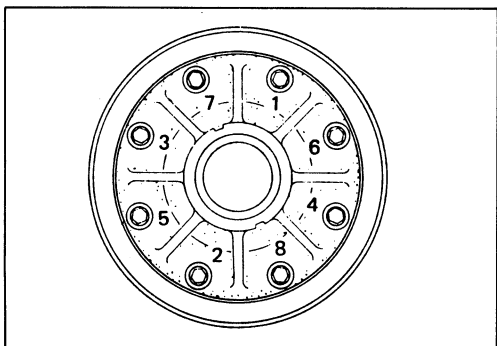
7. Ring gear

When installing the ring gear, apply to the threaded holes and bolts after treatment of the bolts with primer N.

8. Bolt

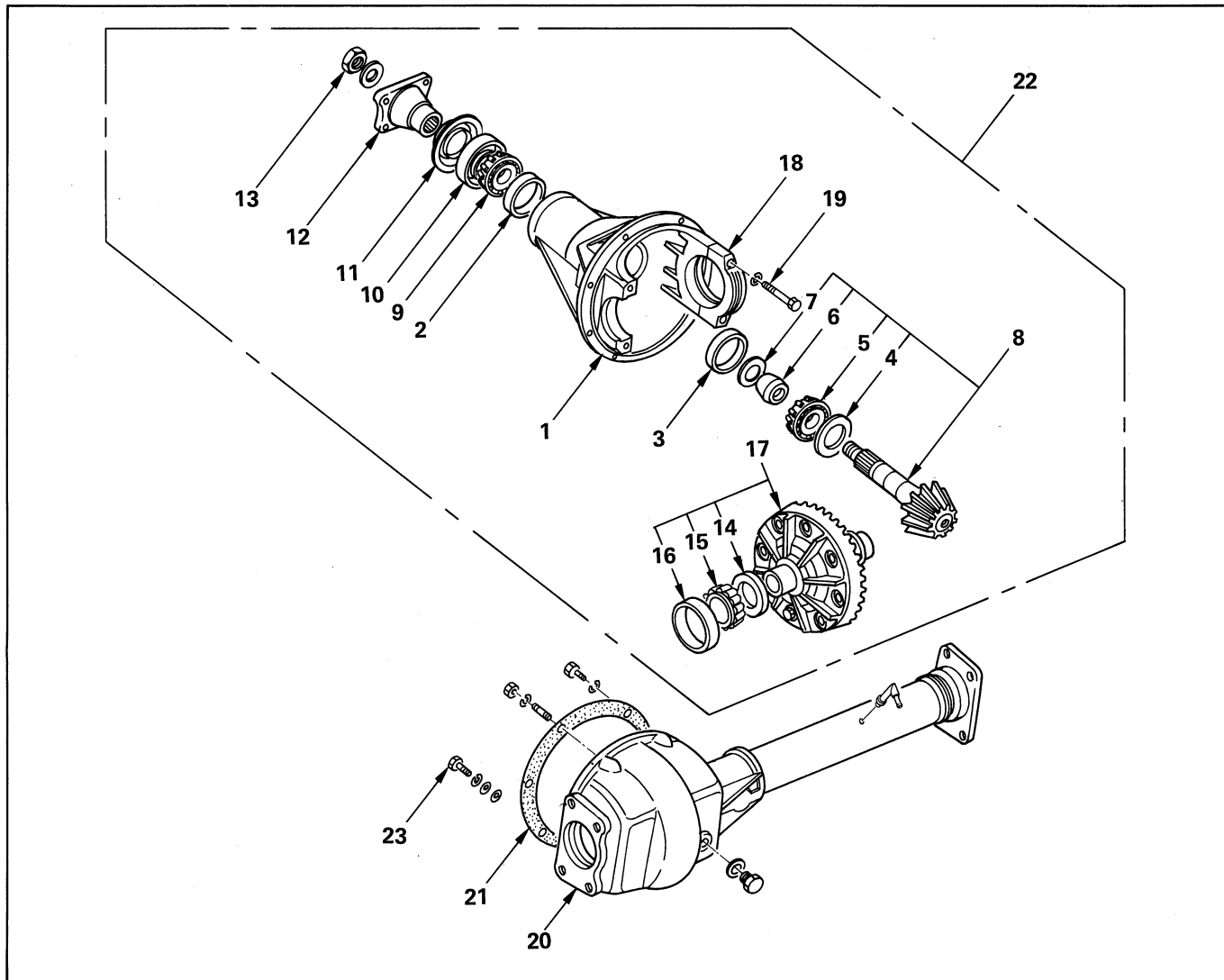
Tighten the bolts in diagonal sequence as illustrated.

Torque	kg-m(ft.lbs.)	7.0 — 9.0 (51 — 65)
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Note: Discard used bolts and install new ones.

MAJOR COMPONENT

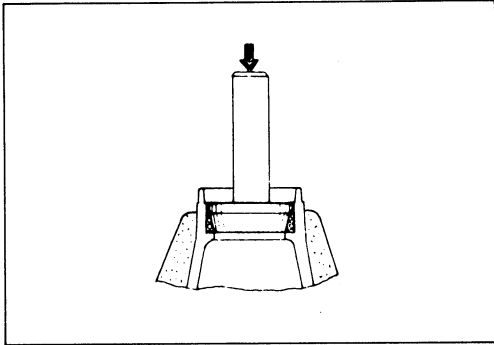


Reassembly steps

- | | |
|---------------------------------|-----------------------------|
| 1. Diff. carrier | ▲ 13. Flange nut |
| ▲ 2. Bearing outer race | ▲ 14. Adjust shim |
| ▲ 3. Bearing outer race | ▲ 15. Side bearing |
| ▲ 4. Adjust shim | 16. Bearing outer race |
| ▲ 5. Inner bearing | 17. Diff. cage assembly |
| 6. Distance piece ; collapsible | ▲ 18. Bearing cap |
| ▲ 7. Adjust shim | ▲ 19. Bolt |
| 8. Pinion gear | 20. Axle case |
| 9. Outer bearing | 21. Packing |
| ▲ 10. Oil seal | ▲ 22. Differential assembly |
| 11. Dust cover | 23. Bolt |
| ▲ 12. Flange | |



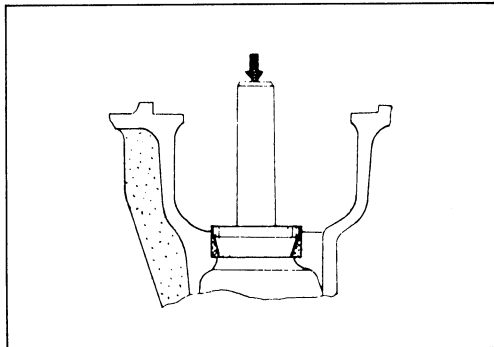
Important operations



2. Bearing outer race

Installer : J-29038

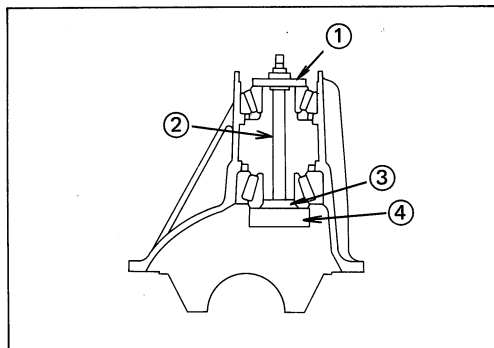
Grip : J-8092



3. Bearing outer race

Installer : J-29039

Grip : J-8092



4. Adjust Shim

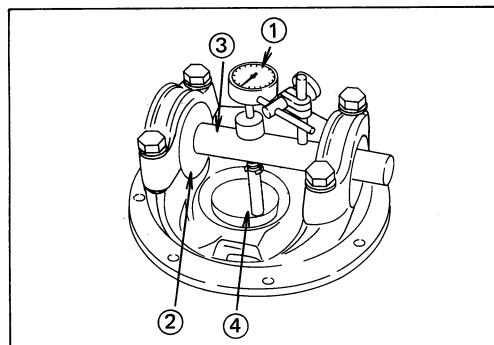
Adjustment of drive pinion mounting distance



- (1) Apply gear oil to the inner and outer drive pinion bearing. Clean the pinion setting gage set. Then install the gage set together with the inner and outer bearings.



- ① Front pilot : J-23597-28
- ② Stud and nut : J-21777-43
- ③ Rear pilot : J-23597-27
- ④ Gage plate : J-23597-26



Tighten the nut to the specified torque.

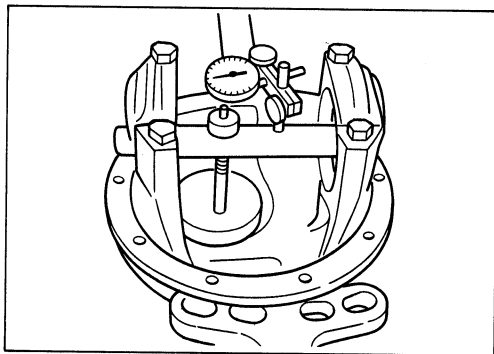
Torque	kg-cm(in.lbs.)	2.3 (20)
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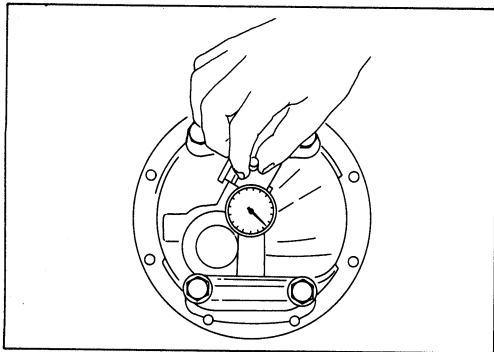
- (2) Clean the side bearing bores. Install the dial indicator with the discs and Arbor. Install and tighten the bearing caps to the specified torque.

Torque	kg-m(ft.lbs.)	7.0 (50)
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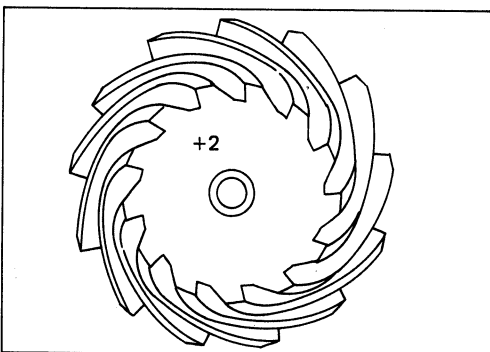
- ① Dial indicator : J-8001
- ② Disc (2 pcs.) : J-23597-24
- ③ Arbor : J-23597-1
- ④ Gage plate : J-23597-26



- (3) Set the dial indicator to ZERO. Then, position it on the mounting post of the gaging arbor with the contact button touching the indicator pad. Push the dial indicator downward until the needle rotates approx. 1/2 turn clockwise. Tighten the dial indicator in this position and recheck. Rotate the gaging arbor slowly back and forth until the dial indicator shows the greatest deflection. At the point of greatest deflection, set the dial indicator to ZERO. Repeat the rocking action of the gaging arbor to verify the ZERO setting.



- (4) After the ZERO setting is obtained, rotate the gaging arbor until the dial indicator rod does not touch the gaging plate. Record the number the dial indicator needle points to.

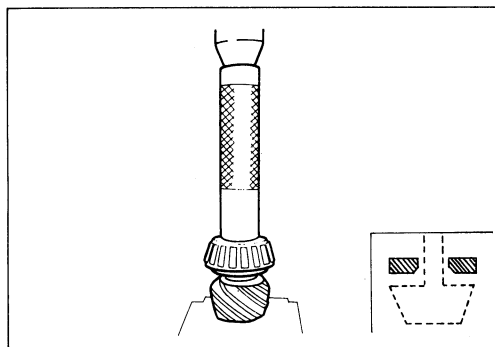


- (5) Record the pinion depth code on the head of drive pinion.
- The number indicates a necessary change in the pinion mounting distance. A plus number indicates the need for greater mounting distance (which can be achieved by decreasing the shim thickness). A minus number indicates the need for a smaller mounting distance (which can be achieved by increasing the shim thickness). If examination reveals pinion depth code "0", the pinion is "nominal".
 - Use the chart below to determine the proper shim variation to compensate for plus or minus markings.

(6) Select the shim using the chart ;

Pinion marking Dial indicator reading (Inches)	+6	+4	+2	0	-2	-4	-6
0.052							1.39(0.0547)
0.053						1.39(0.0547)	1.41(0.0555)
0.054					1.39(0.0547)	1.41(0.0555)	1.43(0.0563)
0.055				1.39(0.0547)	1.41(0.0555)	1.43(0.0563)	1.45(0.0571)
0.056		1.39(0.0547)	1.41(0.0555)	1.43(0.0563)	1.45(0.0571)	1.47(0.0579)	1.49(0.0587)
0.057	1.39(0.0547)	1.41(0.0555)	1.43(0.0563)	1.45(0.0571)	1.47(0.0579)	1.49(0.0587)	1.51(0.0594)
0.058	1.41(0.0555)	1.43(0.0563)	1.45(0.0571)	1.47(0.0579)	1.49(0.0587)	1.51(0.0594)	1.53(0.0602)
0.059	1.43(0.0563)	1.45(0.0571)	1.47(0.0579)	1.49(0.0587)	1.51(0.0594)	1.53(0.0602)	1.55(0.0610)
0.060	1.47(0.0579)	1.49(0.0587)	1.51(0.0594)	1.53(0.0602)	1.55(0.0610)	1.57(0.0618)	1.59(0.0626)
0.061	1.49(0.0587)	1.51(0.0594)	1.53(0.0602)	1.55(0.0610)	1.57(0.0618)	1.59(0.0626)	1.61(0.0634)
0.062	1.51(0.0594)	1.53(0.0602)	1.55(0.0610)	1.57(0.0618)	1.59(0.0626)	1.61(0.0634)	1.63(0.0642)
0.063	1.55(0.0610)	1.57(0.0618)	1.59(0.0626)	1.61(0.0634)	1.63(0.0642)	1.65(0.0650)	1.67(0.0657)
0.064	1.57(0.0618)	1.59(0.0626)	1.61(0.0634)	1.63(0.0642)	1.65(0.0650)	1.67(0.0657)	1.69(0.0665)
0.065	1.59(0.0626)	1.61(0.0634)	1.63(0.0642)	1.65(0.0650)	1.67(0.0657)	1.69(0.0665)	1.71(0.0673)
0.066	1.61(0.0634)	1.63(0.0642)	1.65(0.0650)	1.67(0.0657)	1.69(0.0665)	1.71(0.0673)	1.73(0.0681)
0.067	1.65(0.0650)	1.67(0.0657)	1.69(0.0665)	1.71(0.0673)	1.73(0.0681)	1.75(0.0689)	1.77(0.0697)
0.068	1.67(0.0657)	1.69(0.0665)	1.71(0.0673)	1.73(0.0681)	1.75(0.0689)	1.77(0.0697)	
0.069	1.69(0.0665)	1.71(0.0673)	1.73(0.0681)	1.75(0.0689)	1.77(0.0697)		
0.070	1.71(0.0673)	1.73(0.0681)	1.75(0.0689)	1.77(0.0697)			
0.071	1.75(0.0689)	1.77(0.0697)					
0.072	1.77(0.0697)						

Note: When ordering shims, find the part number in the parts catalog by using the thickness of shims listed in the above table.



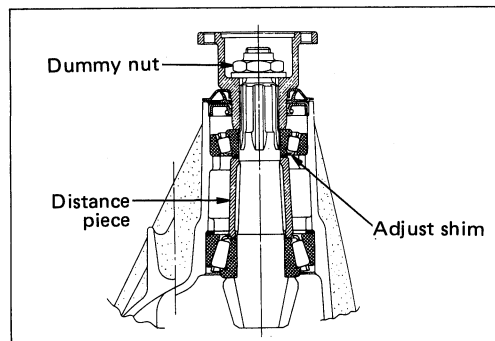
5. Inner bearing

Place the shim on the drive pinion, with the chamfered side turned towards the pinion head then install the inner bearing on to the pinion using an installer and a press.

Installer : J-6133-01



Note: Do not apply pressure to the roller cage.
Apply pressure only to the inner race.



7. Adjusting shim

Adjustment of drive pinion preload

(1) Apply gear oil to the drive pinion bearing inner and outer, Place the distance piece and adjusting shims on the pinion gear with the inner bearing.

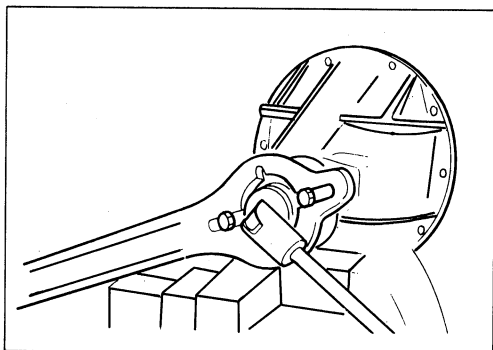
Then install these parts into the diff. carrier and retain them with the outer bearing, flange and dummy nut.

Dummy nut ; J-34357



Oil seal should not be installed at this stage of assembly.



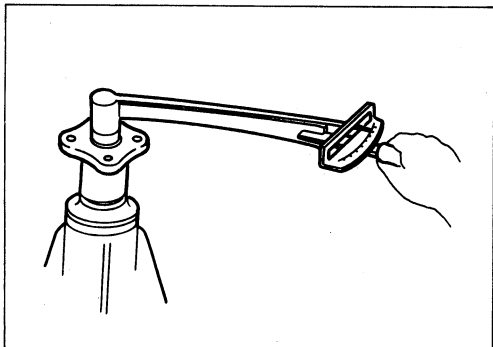


- (2) Tighten the dummy nut to the specified torque using the pinion flange holder.

Pinion flange holder ; J-8614-01



Dummy nut torque	kg-m(ft.lbs.)	13 — 16 (94 — 115)
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- (3) Measure the starting torque.

Starting torque without oil seal	kg-m(ft.lbs.)	5 — 6 (4.3 — 5.2)
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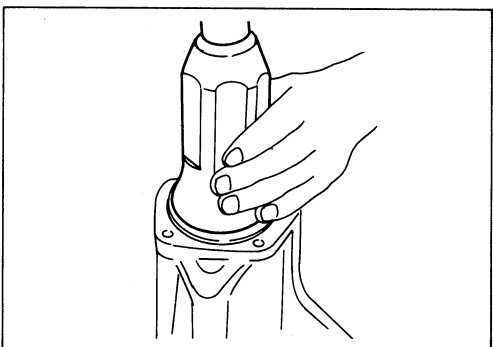
- (4) Adjustment should be made by varying the thickness of the adjusting shim, so that a specified starting torque is obtained within the specified dummy nut torque.

The starting torque decreases when total thickness of the shims is increased, and increases with a reduction in shim thickness.

Adjusting shim thickness

mm	1.50, 1.53, 1.56, ... 1.92, 1.95
in.	0.0591, 0.0602, 0.0615, ... 0.0756, 0.0768

- (5) Remove the dummy nut and flange.

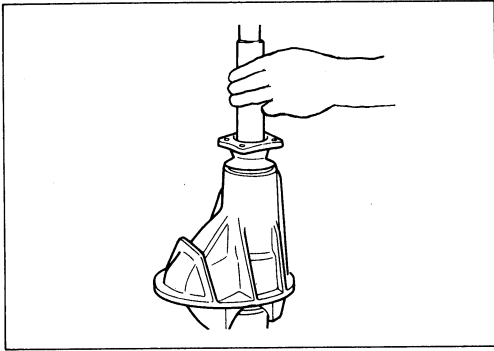


10. Oil seal

Use oil seal installer to install a new oil seal that has been soaked in rear axle lubricant.

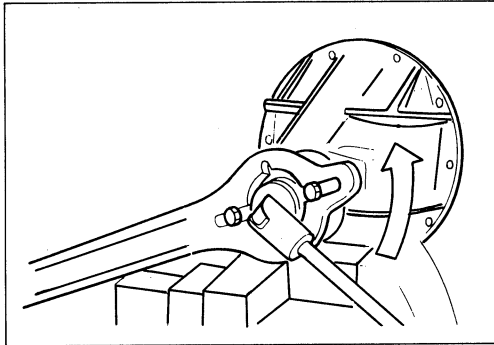


Installer : J-26234



12. Flange

Pinion flange installer : J-6403-C



13. Flange nut

- (1) Apply lubricant to the pinion threads.
- (2) Tighten the nut to the specified torque using the pinion flange holder.

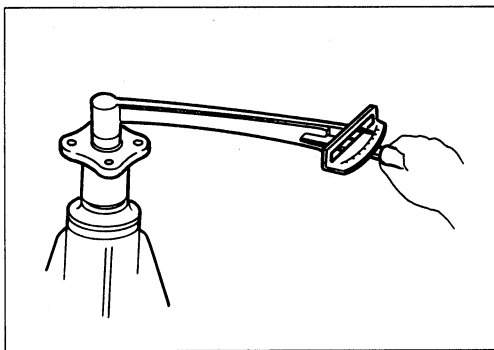


Pinion flange holder : J-8614-01

Torque	kg-m(ft.lbs.)	12 - 13 (87 - 94)
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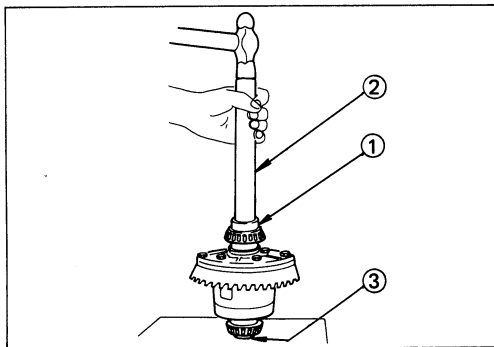


Discard used flange nut and install new one.



- (3) Continue tightening until the specified starting torque is obtained.

Starting torque	kg-cm(in.lbs.)	6 - 11 (5 - 10)
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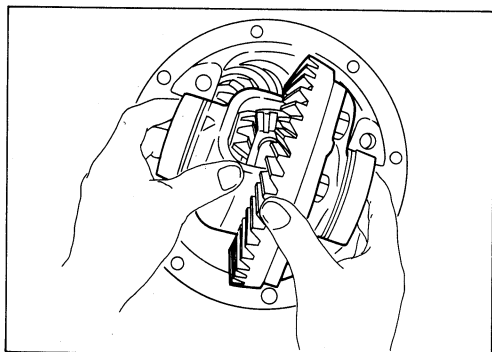


14. Adjust shim

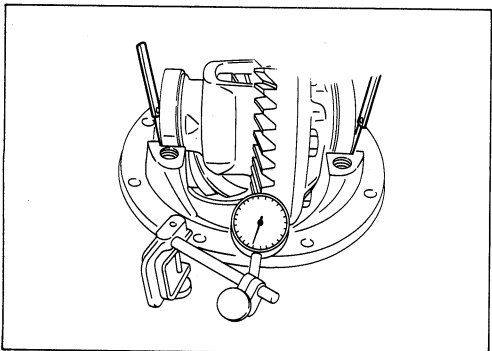
- (1) Attach the side bearing to the differential assembly without shims. Support the opposite side using a pilot to prevent bearing damage.



- ① Installer : J-29036
- ② Drive handle : J-8092
- ③ Pilot : J-8107-2

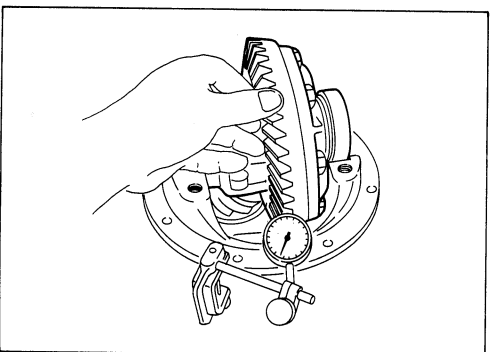


- (2) Insert the differential cage assembly with bearing outer races into the side bearing bores of the carrier.



- (3) Using two sets of feeler gauges, insert a feeler stock of sufficient thickness between each bearing outer race and the carrier to remove all end play. Make certain the feeler stock is pushed to the bottom of the bearing bores. Mount the dial indicator on the carrier so that the indicator stem is at right angles to a tooth on the ring gear.

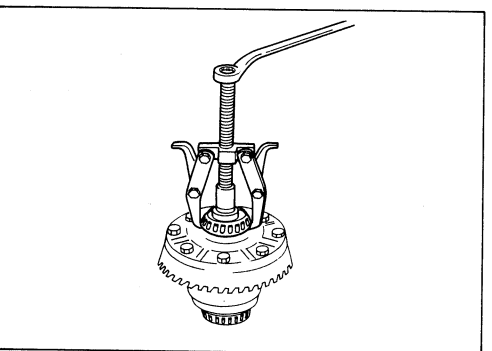
Dial indicator : J-8001



- (4) Adjust feeler gauge thickness from side to side until ring gear backlash is in the specified range.

Backlash	mm(in.)	0.13 — 0.18 (0.005 — 0.007)
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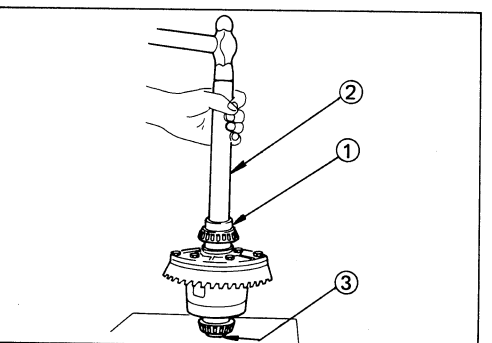
With zero end play and correct backlash established, remove the feeler gauge packs, determine the thickness of the shims required and add 0.05 mm (0.002 in.) to each shim pack to provide side bearing preload. Always use new shims.



- (5) Remove side bearing

Remover : J-22888

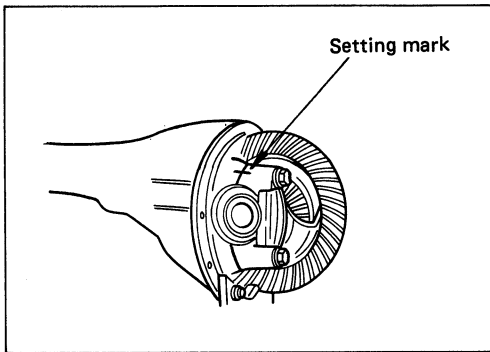
Pilot : J-8107-2



15. Side bearing

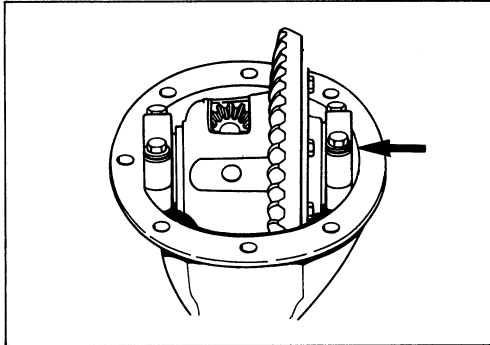
Install the side bearings together with the selected shims.

- ① Installer : J-29036
- ② Drive handle : J-8092
- ③ Pilot : J-8107-2



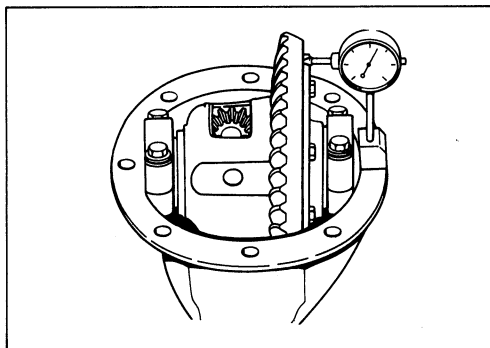
18. Bearing cap

Align the setting marks applied at disassembly.



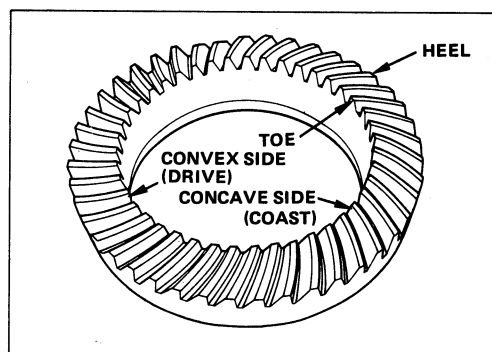
19. Bolt

Torque	kg-m(ft.lbs.)	7.0 (50.6)
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Measure the amount of run-out of the ring gear at its rear face.

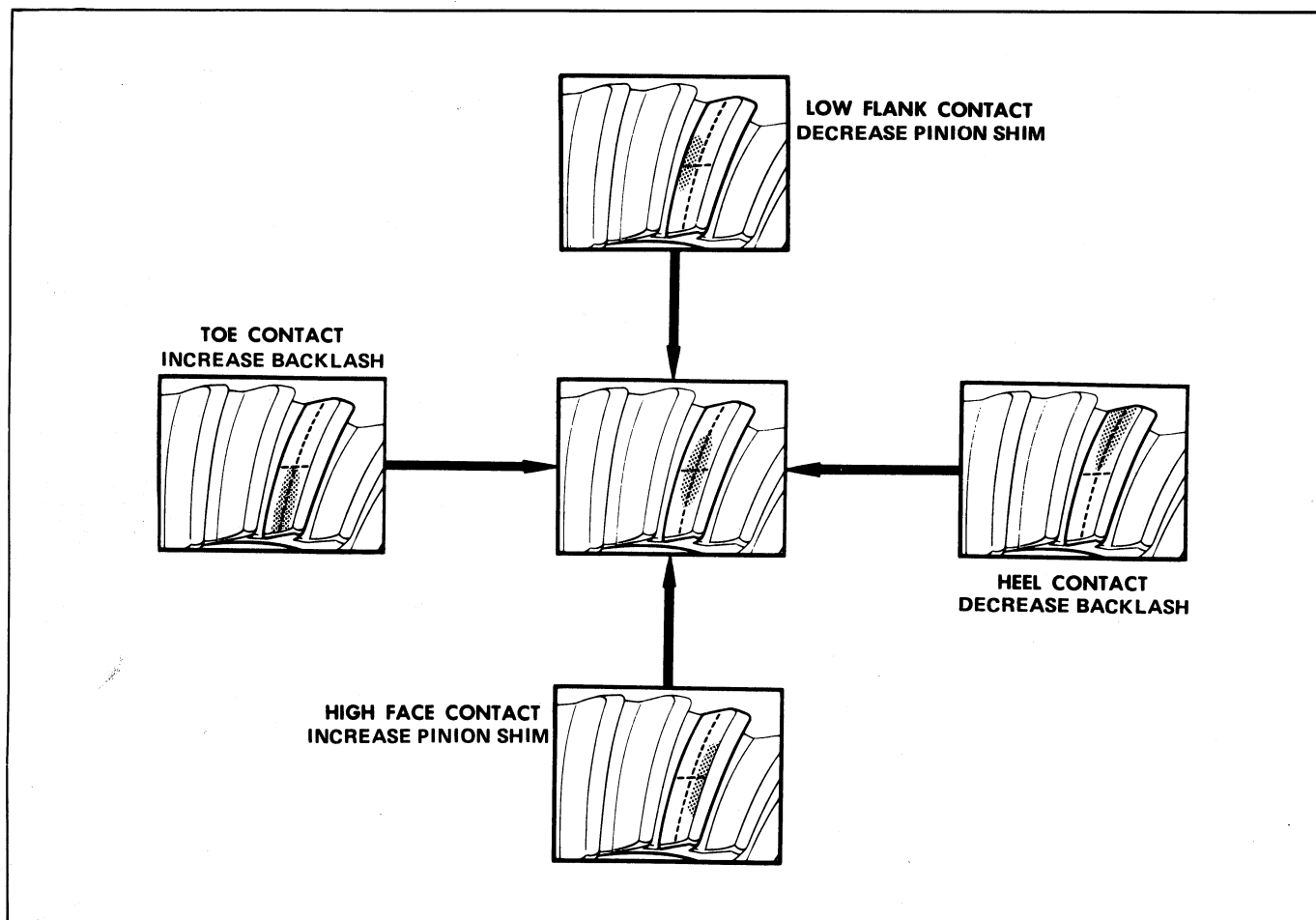
mm(in.)	
Standard	Limit
0.02 (0.001)	0.05 (0.002)



Gear tooth contact pattern check and adjustment

Apply a thin coat of prussian blue or equivalent to the faces of the 7 — 8 teeth of the ring gear. Check the impression of contact on the ring gear teeth and make necessary adjustment as described below if the contact is abnormal.

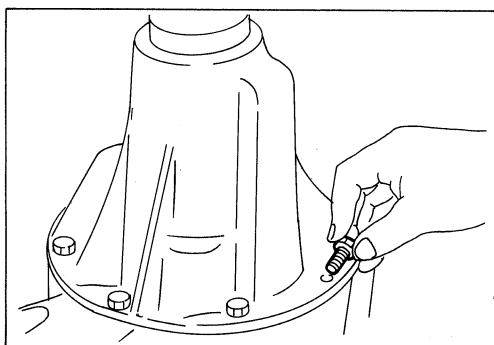
- 1 : Tow
- 2 : Heel



22. Differential assembly



- (1) Clean the faces of the front axle case and differential carrier. Apply a thin coat of liquid gasket. Install the gasket.
- (2) Attach the differential case and the carrier assembly to the rear axle case and tighten the nuts and bolts. The bottom case bolt is used for drainage.



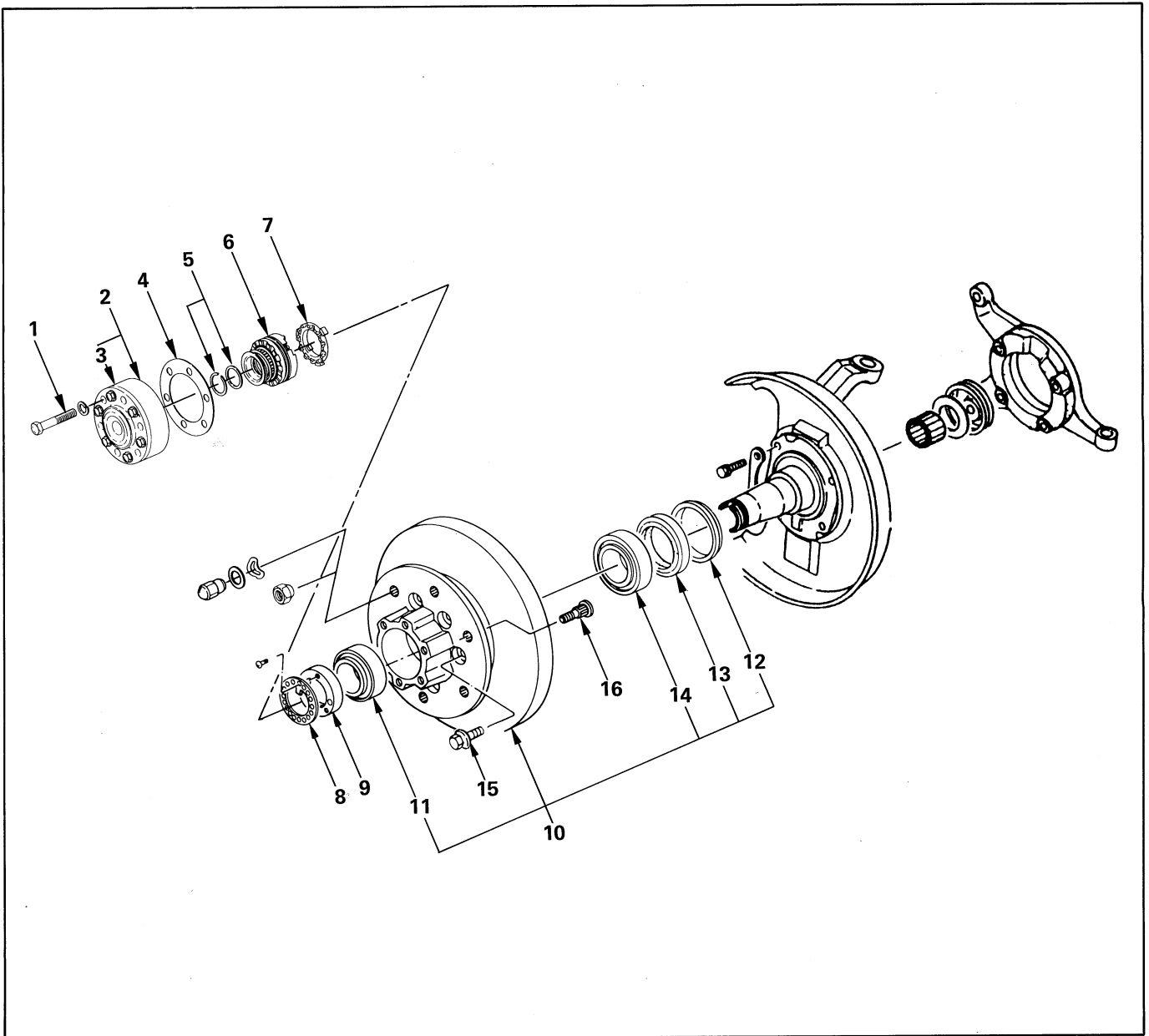
- (3) Install the axle shaft assemblies as instructed earlier in this section under "Axle Shaft Replacement".
- (4) Fill the axle case with hypoid gear lubricant, to just below the filler hole. Lubricant capacity : 1.0 liter (0.26 gal).

Torque	kg-m(ft.lbs.)	2.3 — 2.7 (17 — 20)
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FRONT HUB AND DISC



DISASSEMBLY

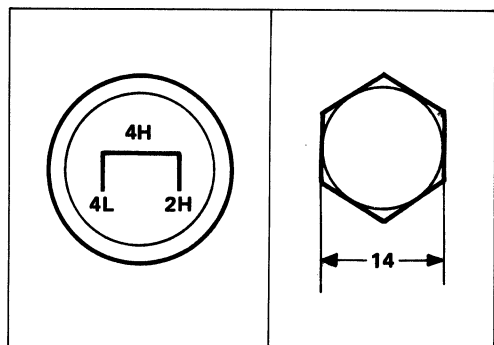


Disassembly steps

- | | |
|---------------------------|------------------------------------|
| ▲ 1. Bolt | ▲ 9. Hub nut |
| 2. Housing assembly | ▲ 10. Hub and disc assembly |
| 3. Driven clutch assembly | ▲ 11. Outer bearing and outer race |
| 4. Spacer | 12. Retaining ring |
| 5. Snap ring and shims | 13. Oil seal |
| 6. Drive clutch assembly | ▲ 14. Inner bearing and outer race |
| 7. Inner cam | ▲ 15. Bolt |
| 8. Lock washer | ▲ 16. Wheel pin |

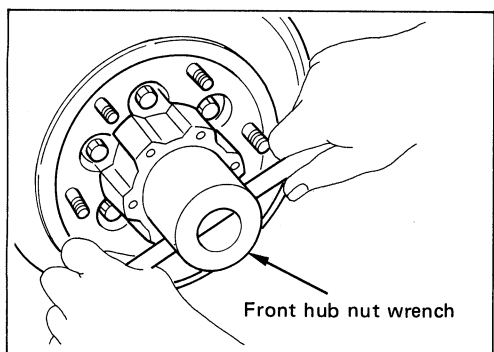


Important operations



1. Bolt

Shift the transfer lever to the "2H" position and move the vehicle forward and rearward about one meter.
Remove the 14 mm hex bolts.



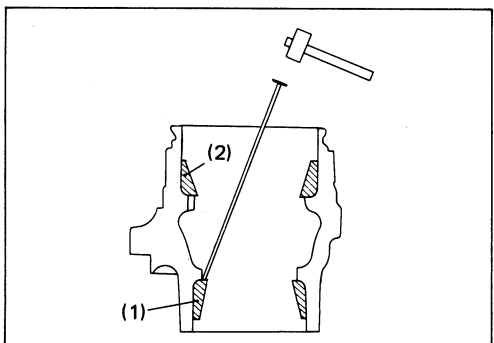
9. Hub nut

Wrench : J-29020-A

Refer to Section 09 "Brake" for disc brake caliper removal procedure.

10. Hub and disc assembly

Before disassembly, remove the disc brake caliper assembly and hang it on the frame with wires.

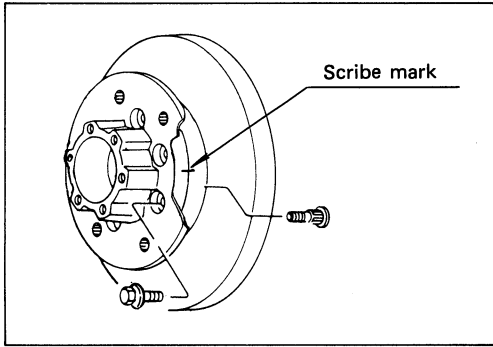


11. Outer bearing and outer race

14. Inner bearing and outer race

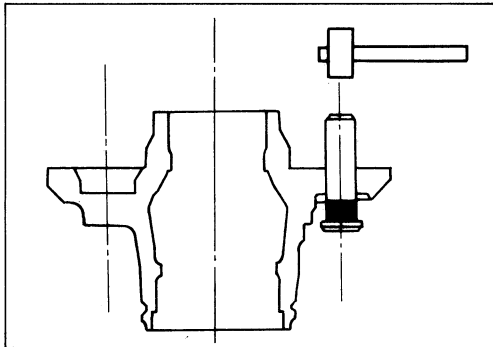
- (1) Remove the outer bearing from the hub with fingers.
The inner bearing will remain in the hub and may be removed after prying out the inner bearing lip seal assembly.
- (2) Remove the outrace by driving out the race from the hub with a brass drift inserted behind the race in the notches in the hubs.

If necessary, replace the wheel pin in the following manner.



15. Bolt

- (1) Apply a scribe mark to disc to hub.
- (2) Clamp the hub and disc assembly in a vise using protective pads and remove the six 6 disc to hub retaining bolts.



16. Wheel pin

Place pins hub on a suitable work surface and remove the wheel studs, as required, using a hammer.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

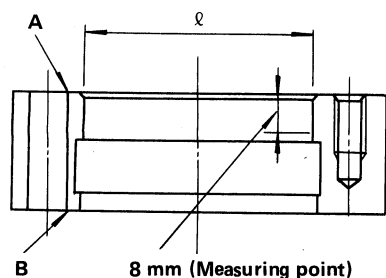
For inspection and servicing of disc caliper, and relative parts, refer to Section 09 "Brakes".

- Hub
- Hub bearing, oil seal
- Knuckle spindle
- Disc
- Caliper
- Automatic locking hubs



Visual check

Inspect the following parts for wear, damage, or other abnormal conditions.



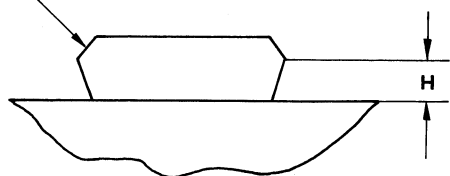
Inside diameter of housing

mm(in.)

Standard	Limit
61.04 (2.403)	61.24 (2.411)

Inspect flange surface A and B for excessive wear.

Chamfer



Teeth height of the driven clutch and the drive clutch

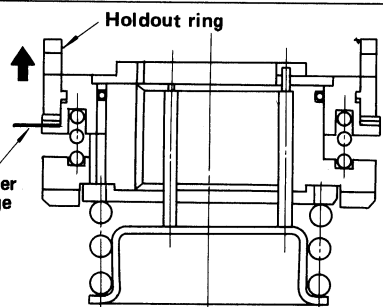
mm(in.)

Standard	Limit
2.3 (0.091)	2.0 (0.079)

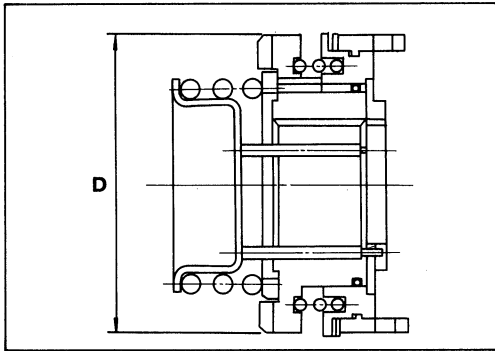
Holdout ring axial play of the drive clutch assembly

mm(in.)

Standard	Limit
0.3 (0.012) or less	0.4 (0.016)



FRONT AXLE AND FRONT PROPELLER SHAFT 07—39



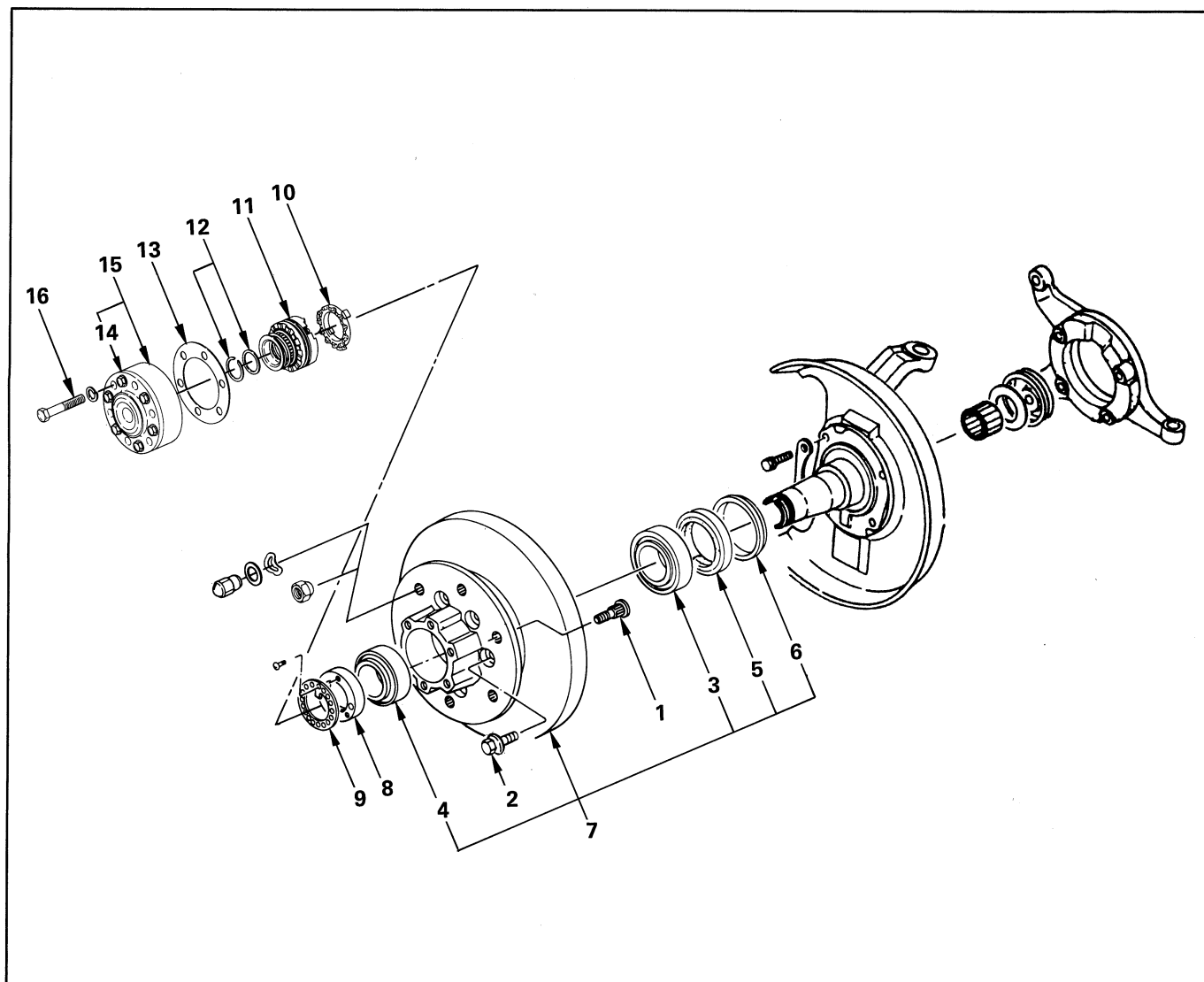
Outside diameter of the drive clutch assembly

mm(in.)

Standard	Limit
60.75 (2.39)	60.55 (2.38)



REASSEMBLY



Reassembly steps

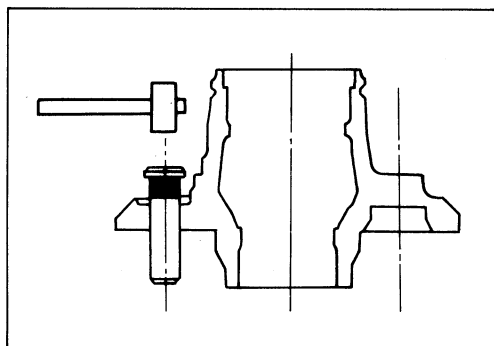
- | | |
|-----------------------------------|------------------------------|
| ▲ 1. Wheel pin | ▲ 9. Lock washer |
| ▲ 2. Bolt | 10. Inner cam |
| ▲ 3. Inner bearing and outer race | 11. Drive clutch assembly |
| ▲ 4. Outer bearing and outer race | ▲ 12. Snap ring and shim |
| ▲ 5. Oil seal | 13. Spacer |
| ▲ 6. Retaining ring | ▲ 14. Driven clutch assembly |
| ▲ 7. Hub and disc assembly | 15. Housing assembly |
| ▲ 8. Hub nut | 16. Bolt |



Important operations

1. Wheel pin

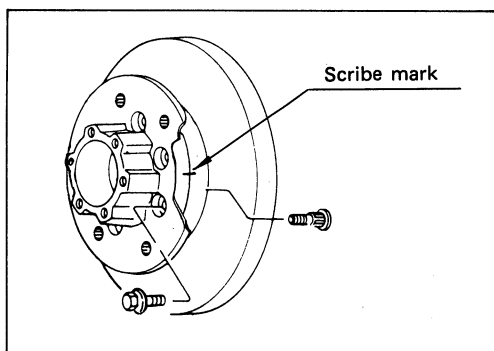
- (1) Place the hub on a wood workbench or a block of wood approx 6" by 6" to protect the wheel stud ends and threads.
- (2) Insert a wheel stud using a hammer.
Be sure the wheel stud is started squarely and seats completely.



2. Bolt

Align scribe marks and attach the hub to the disc.

Torque	kg-m(ft.lbs.)	4.5 — 5.5 (33 — 40)
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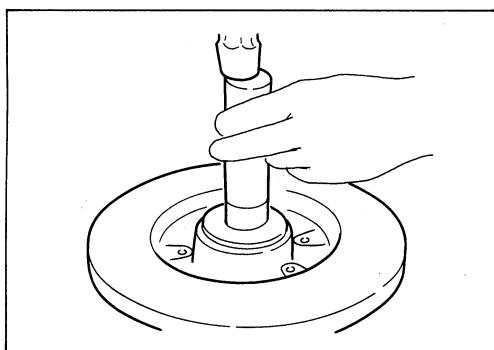


3. Inner bearing and outer race

Outer race ; inner bearing install the outer race by driving it into the hub.

Installer : J-29016

Grip : J-8092



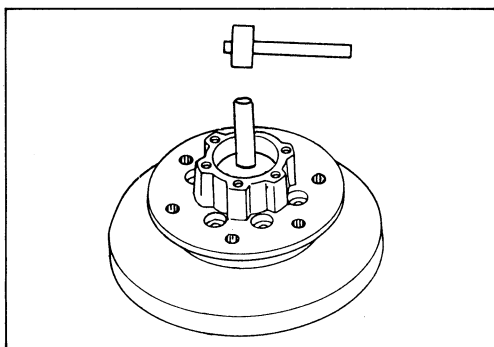
4. Outer bearing and outer race

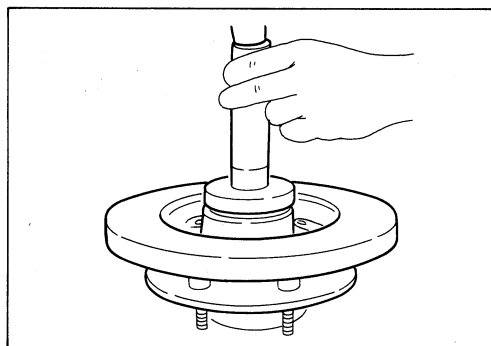
Outer race ; outer bearing

Install the outer race by driving it into the hub.

Installer : J-29015

Grip : J-8092





5. Oil seal

6. Retaining ring

Place the inner bearing onto the outer race in the hub and install a new oil seal and retaining ring.

Installer : J-29017

Grip : J-8092

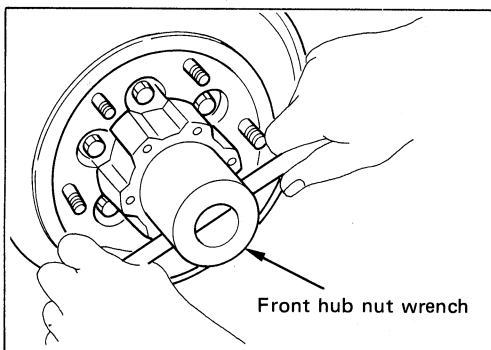


7. Hub and disc assembly

Put grease in the hub.

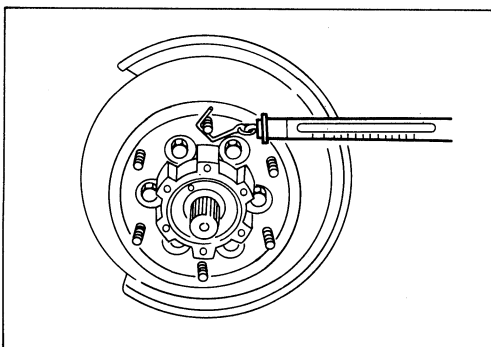
g(oz)

Amount	60 (2.12)
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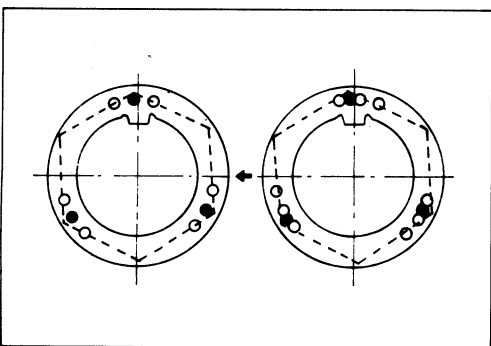
8. Hub nut

(1) Special tool : Wrench J-29020-A



(2) Using a spring scale, adjust the hub bearing preload at the wheel pin.

Preload	kg(lbs.)	1.5 (3.31)
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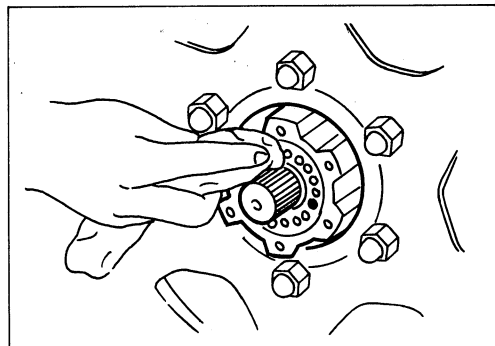
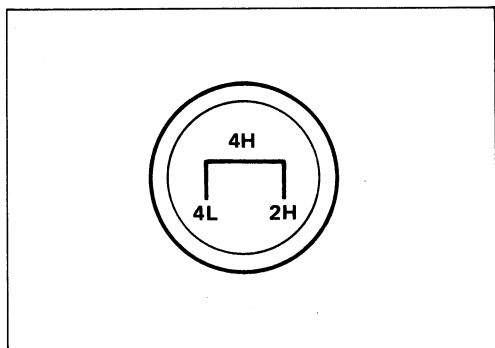
9. Lock washer

If the bolt holes in the lock plate are not aligned with the corresponding holes in the nut, reverse the lock plate.

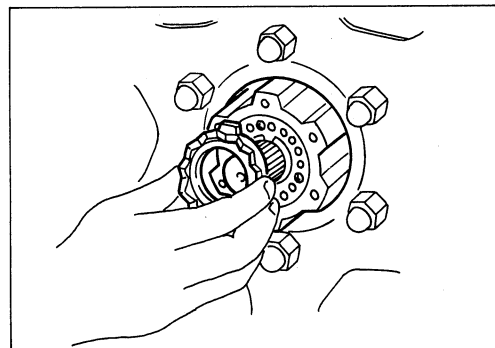
If the bolt holes are still out of alignment, turn in the nut just enough to obtain alignment.

10. Inner cam

(1) Before installation, shift the transfer lever to "2H" position.



(2) Clean the flange surface of the hub, the thread holes, the surface of the lock washer and the spline portion of the axle shaft.

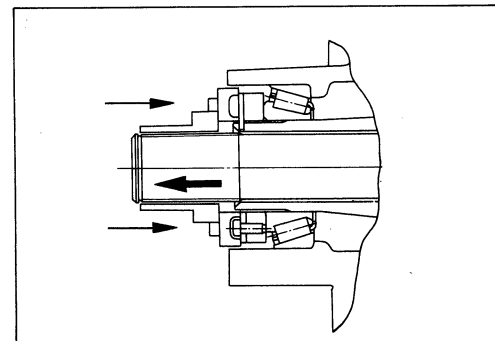
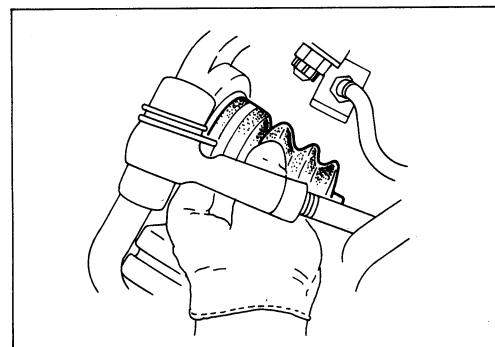


(3) Install the inner cam by aligning the key way of the inner cam with the groove of the knuckle. Hit the inner cam lightly with plastic hammer or equivalent and make sure the inner cam is in contact with the lock washer.

Select the shims using special tool and feeler gauge

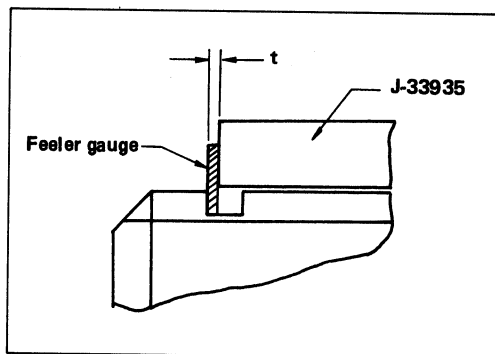
(1) Hold the CV joint part of the axle shaft and push it outward (tire side) as much as possible.

Note: Hold the inner cam with the other hand so as not to move it.

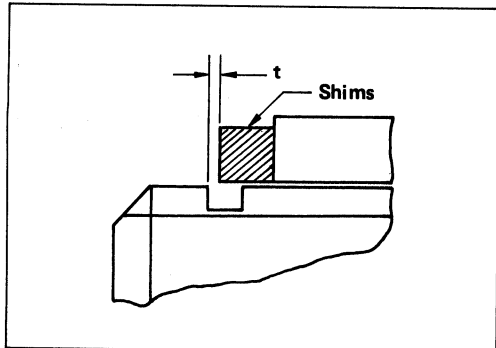


(2) Install the special tool to the axle shaft until it comes into contact with the lock washer.

Special tool; Gauge J-33935



- (3) Measure the clearance "t" between the special tool and the snap ring groove of the axle shaft by using a feeler gauge.



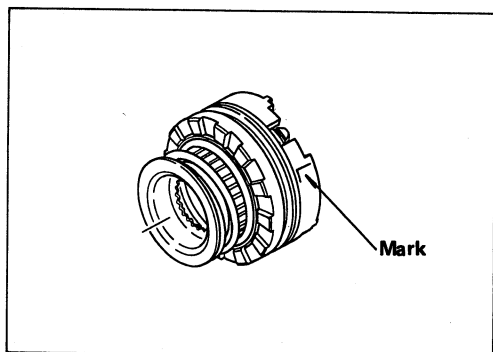
- (4) If the clearance "t" is larger than snap ring groove, insert the shims as illustrated.
Select the shims so that the clearance "t" should be the specified value.

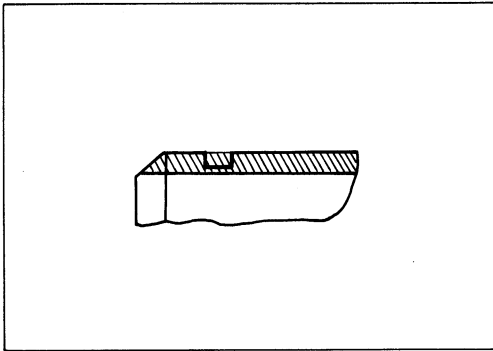
mm(in.)	
Clearance t	0 — 0.1 (0 — 0.0039)

- (5) Remove J-33935, letting the inner cam stay.
If the inner cam is removed, reinstall it as described above.

11. Drive clutch assembly

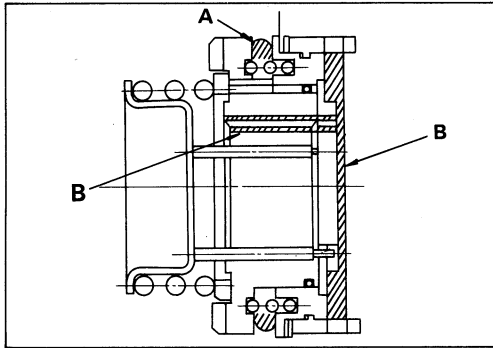
- (1) Check the mark "L" or "R" on the drive clutch assembly.
Install the "L" one to the left hand side, and the "R" one to the right hand side.





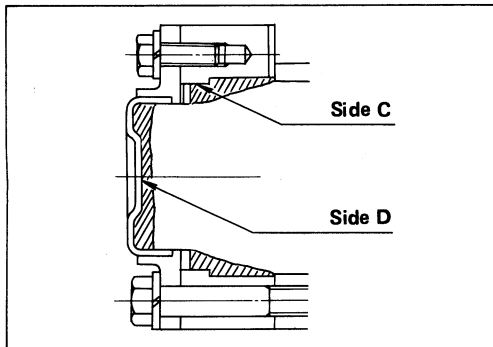
(2) Apply multipurpose grease or hub bearing grease to the following portions.

- Axle shaft splines



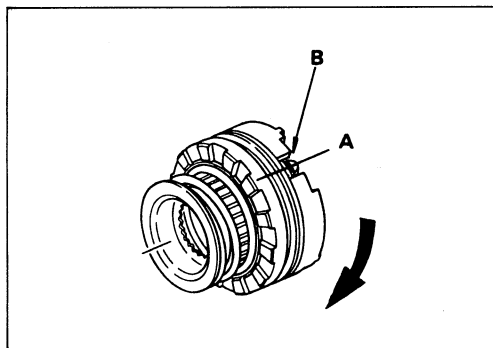
- "A" groove and "B" portion

	g(oz)
"A" Groove	7 (0.25)
"B" portion	3 (0.11)

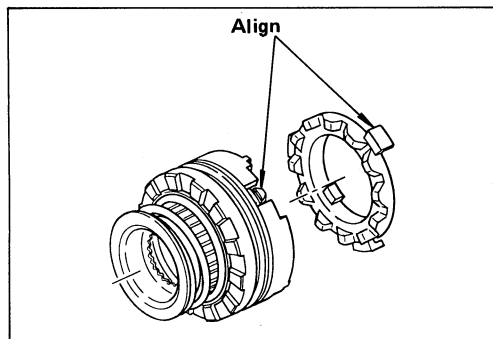


- "C" circumference and "D" portion

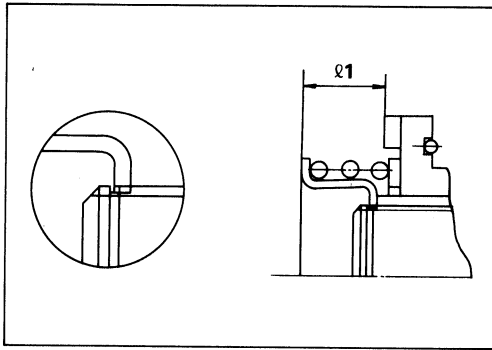
	g(oz)
"C" circumference	5 - 7 (0.18 - 0.25)
"D" portion	3 - 5 (0.11 - 0.18)



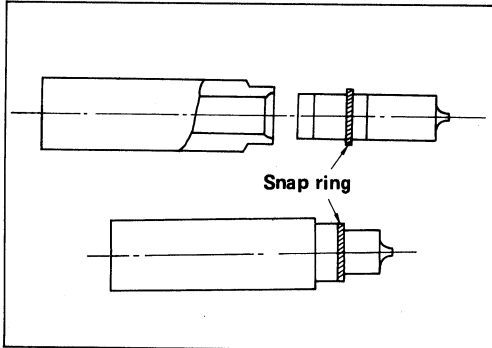
(3) Align the phase of the cut part of the holdout ring (A) and the cam concave part of the drive clutch assembly (B) by turning the holdout ring in direction of the arrow.



(4) Align the cut part of the drive clutch assembly with the concave part of inner cam.
(5) Engage the cam teeth of the drive clutch assembly to that of the inner cam by turning the axle shaft.



- (6) Measure the gap " l_1 " between the retainer surface and the clutch surface to verify proper installation and record it.



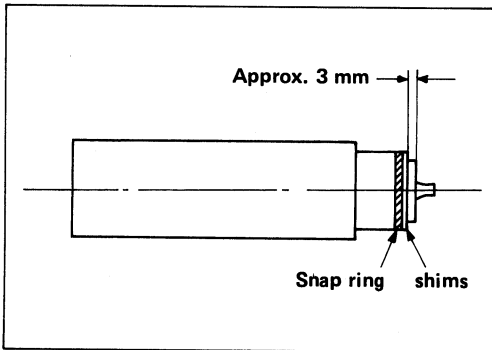
12. Snap ring and shims

Install the shims selected above and the snap ring by using a special tool.

Snap ring installer : J-33934

- (1) Attach the snap ring on to the special tool as illustrated.

Note: Always use a new snap ring.



- (2) Set the snap ring and insert the shims selected above as illustrated.

- (3) Putt the center projection of the special tool into the axle shaft center hole, then hit the special tool with your hand, while holding CV joint part of the axle shaft.

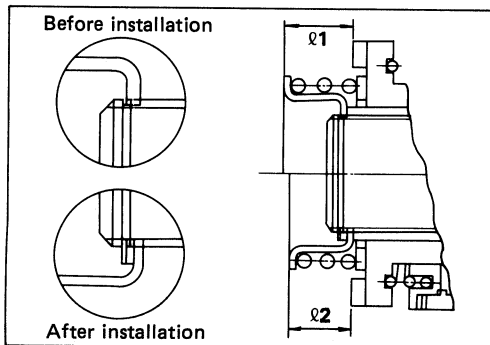
Note: Don't use a hammer.

- (4) Force in the snap ring securely with a driver or equivalent. (Applying load approx. 40 kg)

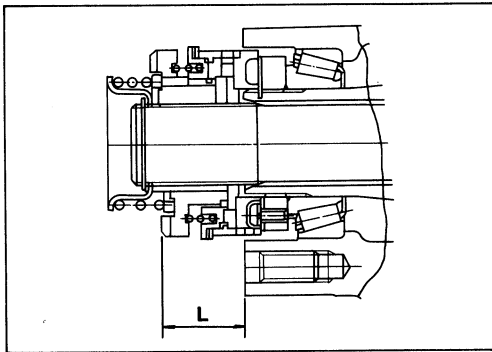


Caution

After installation of the shims and the snap ring, check the fitting condition of the snap ring.

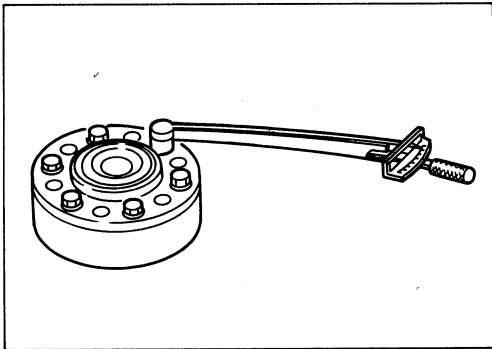


- (5) Measure the gap " l_2 " between the clutch surface and the retainer surface to make sure that shim selection is correct. If " l_1 " — " l_2 " is larger than 0.7 mm (0.028 in.), the thickness of the shim is correct.



13. Spacer

- (1) Measure the distance "L" between hub flange surface and the clutch surface.
 - If $L = 25.4 - 26.2$ mm (1.00 - 1.03 in.)
use no spacer.
 - If $L = 26.3 - 27.2$ mm (1.04 - 1.07 in.)
use spacer of 1 mm thickness.
 - If $L = 27.3 - 28.1$ mm (1.07 - 1.11 in.)
use a spacer of 2 mm thickness.
- (2) Apply loctite 515 or the equivalent to both sides of the spacer.

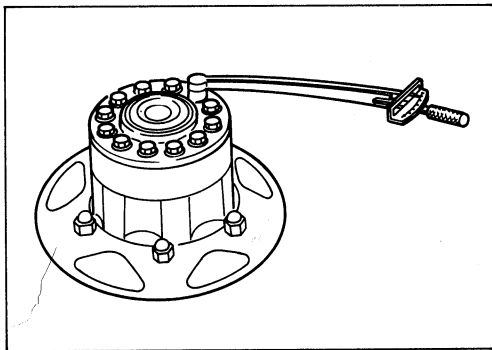


14. 15 Driven clutch assembly and housing

- (1) Apply Loctite 515 or the equivalent to the flange surface of the driven clutch assembly.
- (2) Torque the bolts to the following value.

		kg-m(ft.lbs.)
Torque	kg-m(ft.lbs.)	2.4 - 3.0 (17 - 22)

Note: Be sure to attach the spring washer.



16. Washer and bolt

- (1) Apply Loctite 515 or the equivalent to the flange surface of the housing assembly.
- (2) Make sure that the housing assembly turns smoothly.
If it turns smoothly, the spacer selected above is correct.
- (3) Torque the bolts to the following value:

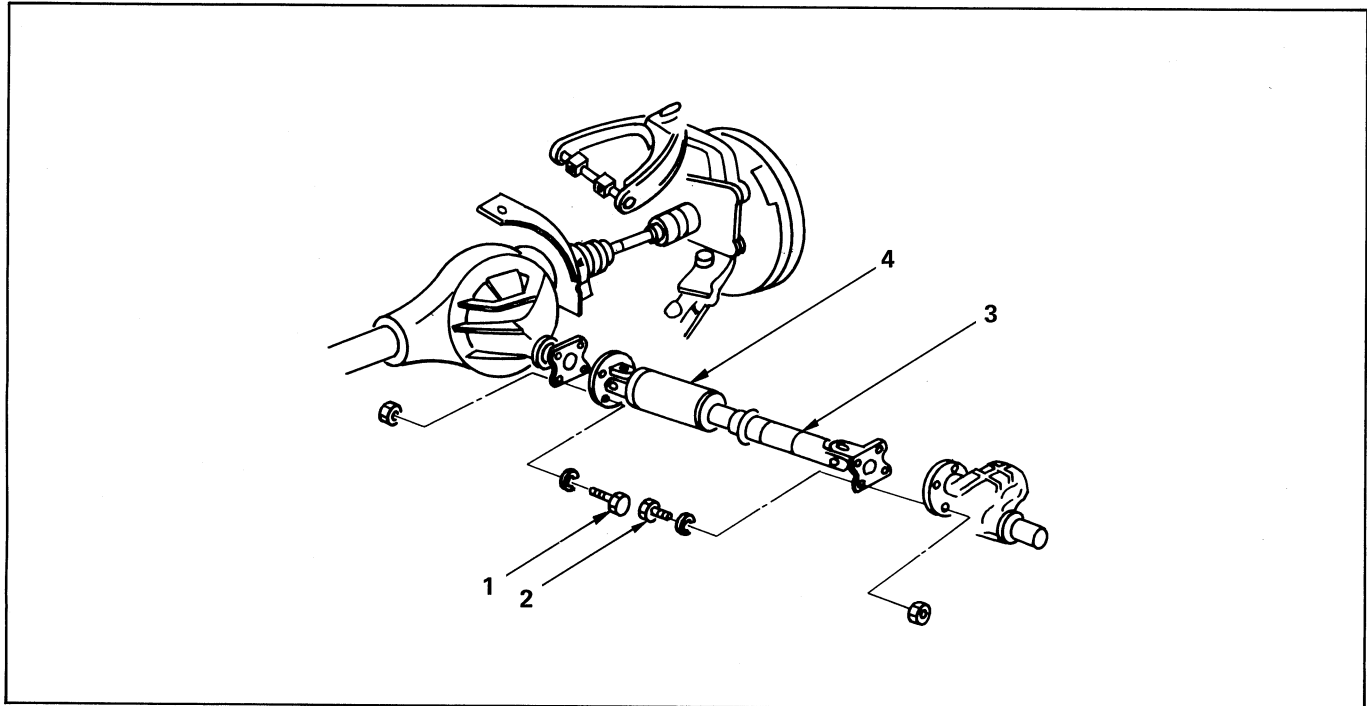
		kg-m(ft.lbs.)
Torque	kg-m(ft.lbs.)	5.5 - 6.5 (40 - 47)

Note: Be sure to attach the spring washer.

FRONT PROPELLER SHAFT



REMOVAL AND INSTALLATION



Since the propeller shaft assembly is carefully balanced, a setting mark should be applied to the flange before removal to indicate the shafts correct position.

Install the parts by aligning the setting marks made at removal.

Removal steps

1. Bolt ; differential side
2. Bolt ; transfer side
3. Propeller shaft assembly ; rear side
4. Propeller shaft assembly ; front side

Installation steps

4. Propeller shaft assembly ; front side
- ▲ 3. Propeller shaft assembly ; rear side
- ▲ 2. Bolt ; transfer side
- ▲ 1. Bolt ; differential side

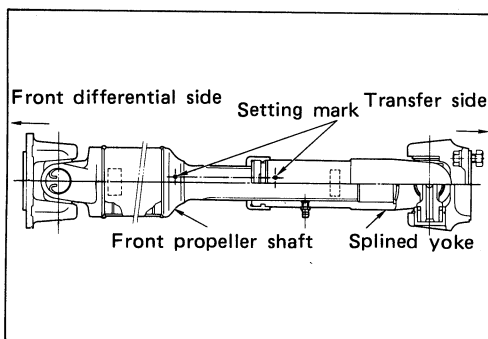


Important operation — Installation



3. Propeller shaft assembly ; front side

Align the indexing marks (about 3 mm dia. punched mark) on the propeller shaft end and the splined yoke.



2. Bolt ; transfer side

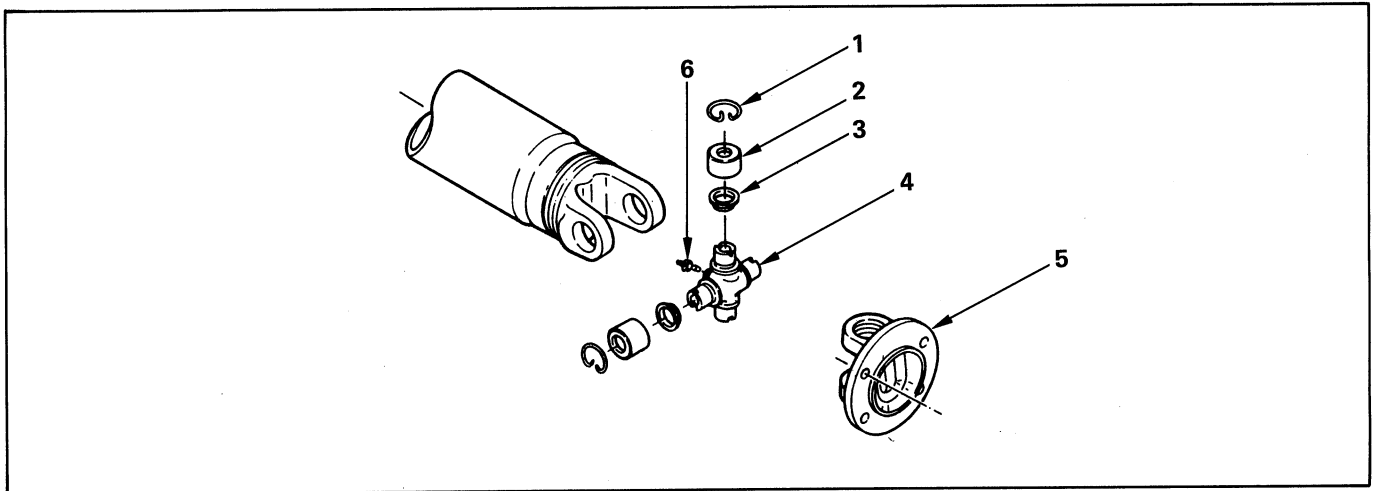
Torque	kg-m(ft.lbs.)	2.6 — 3.0 (19 — 22)
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1. Bolt ; differential side

Torque	kg-m(ft.lbs.)	2.6 — 3.0 (19 — 22)
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DISASSEMBLY



Disassembly steps

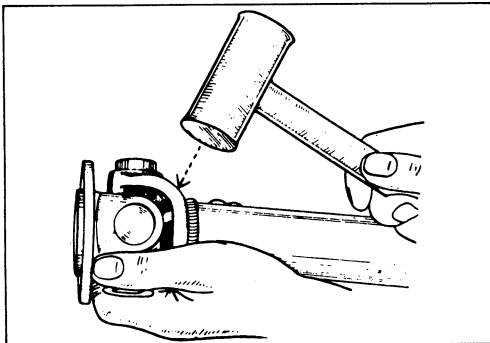
1. Snap ring
- ▲ 2. Needle roller bearing
3. Seal
4. Spider
5. Flange yoke
6. Grease fitting

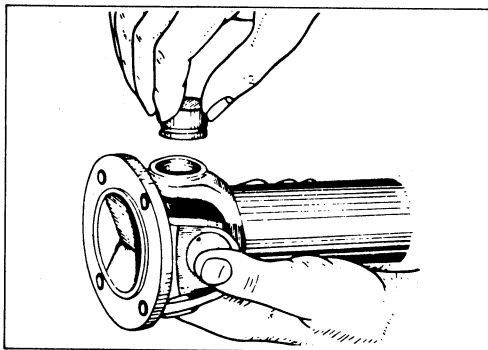


Important operation

2. Needle roller bearing

- (1) Tap out the bearing by striking the shoulder of the yoke using a mallet or a copper hammer.





- (2) As the yoke is tapped, the needle roller bearing comes out gradually, permitting easy removal with hand.



INSPECTION AND REPAIR

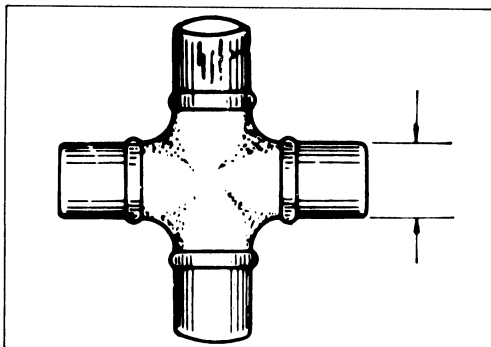
Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

Spider
Needle roller bearing
Yoke
Flange
Center bearing
Cushioning rubber
Bracket



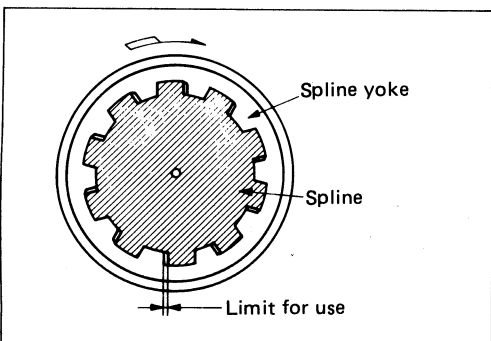
Visual check

Inspect following parts for wear, damage, or other abnormal conditions.



Outside diameter of spider pins

		mm(in.)
	Standard	Limit
Transfer side	17.000 (0.669)	16.90 (0.665)
Differential side	14.724 (0.580)	14.58 (0.574)



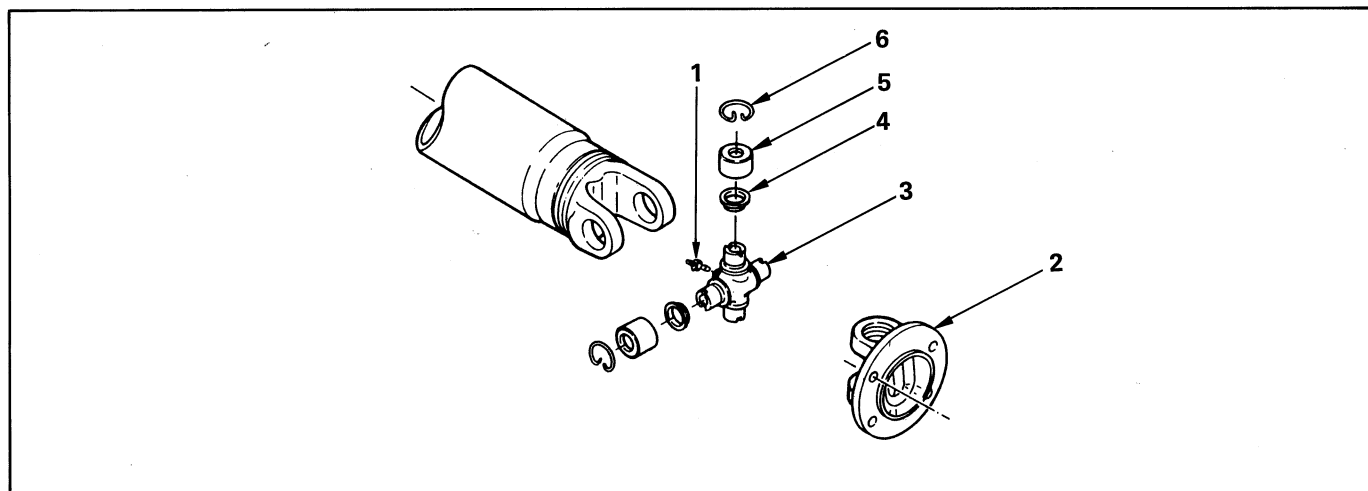
Play in splines in normal direction of rotation

Check the amount of play in the sleeve yoke and propeller shaft splines in the direction of rotation, using a pointed feeler gauge.

	mm(in.)
Standard	Limit
0.074 — 0.156 (0.003 — 0.006)	0.3 (0.012)



REASSEMBLY

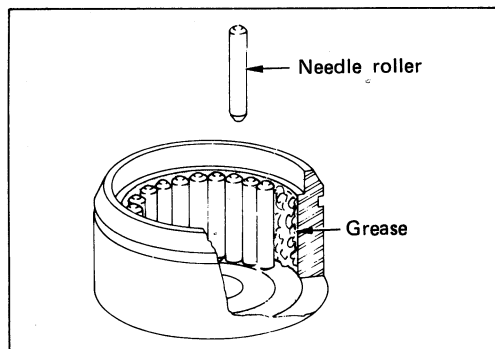


Reassembly steps

- | | |
|-------------------|----------------------------|
| 1. Grease fitting | 4. Seal |
| 2. Flange yoke | ▲ 5. Needle roller bearing |
| 3. Spider | ▲ 6. Snap ring |

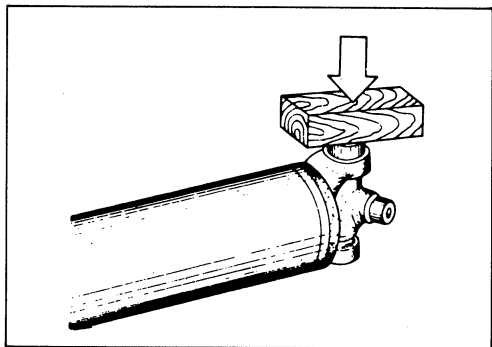


Important operations



5. Needle roller bearing

- (1) Apply a molybdenum-disulfide grease or a multipurpose type grease NLG1 No. 2 to the bearing cap inner surface. Install the needle rollers.



- (2) Attach the spider to the yoke and then insert the needle roller bearing cap into the hole by using a wood block and a hammer or a press.

6. Snap ring

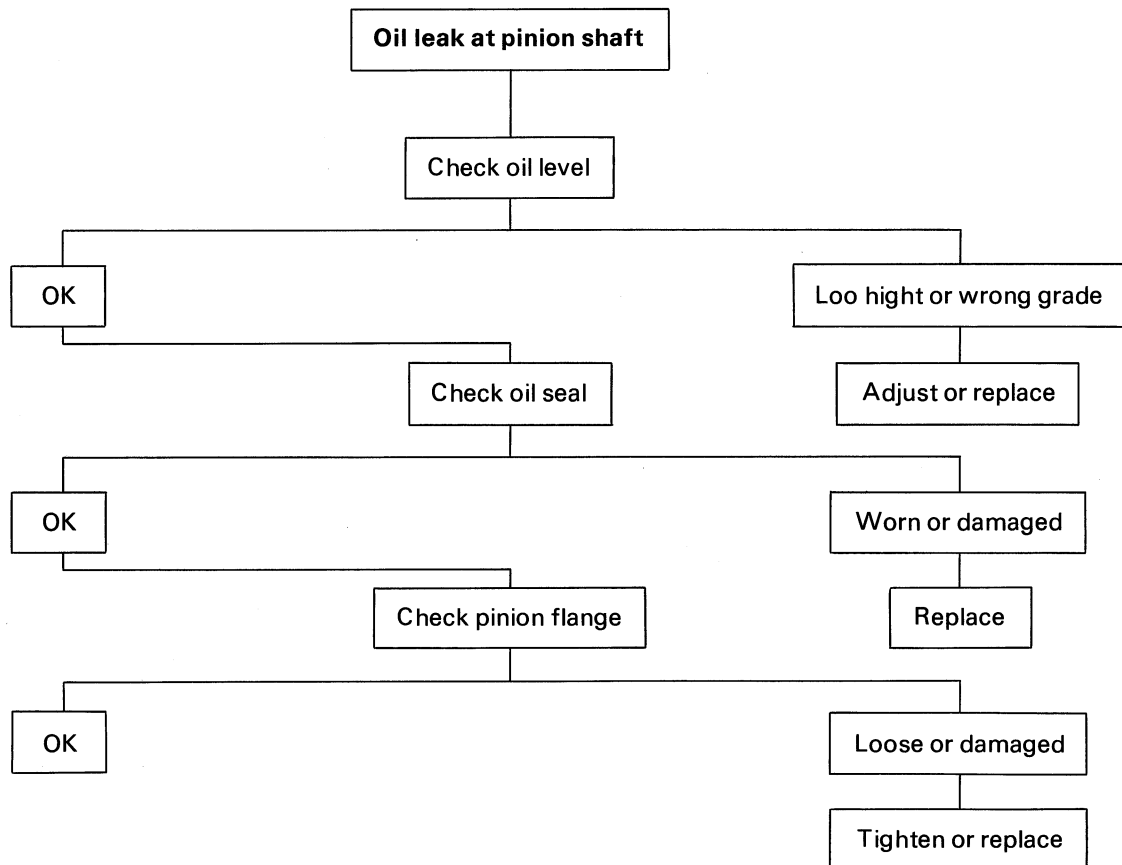
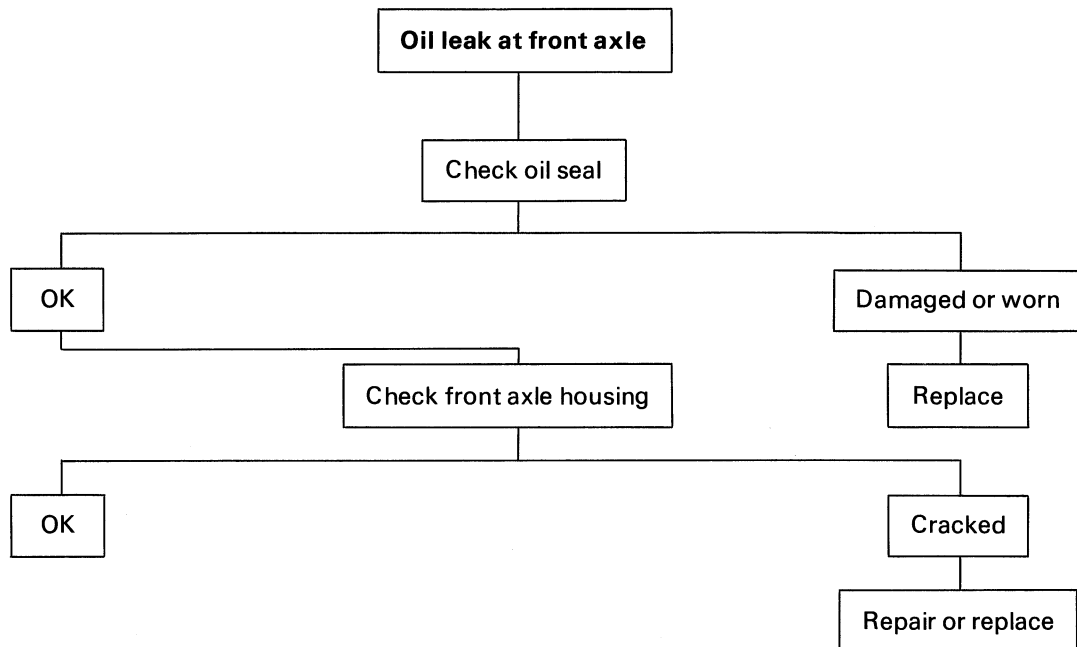
When the bearing cap is in position, select and attach a snap ring of suitable thickness so that the end play of the spider pin is held within 0.1 mm (0.004 in.).

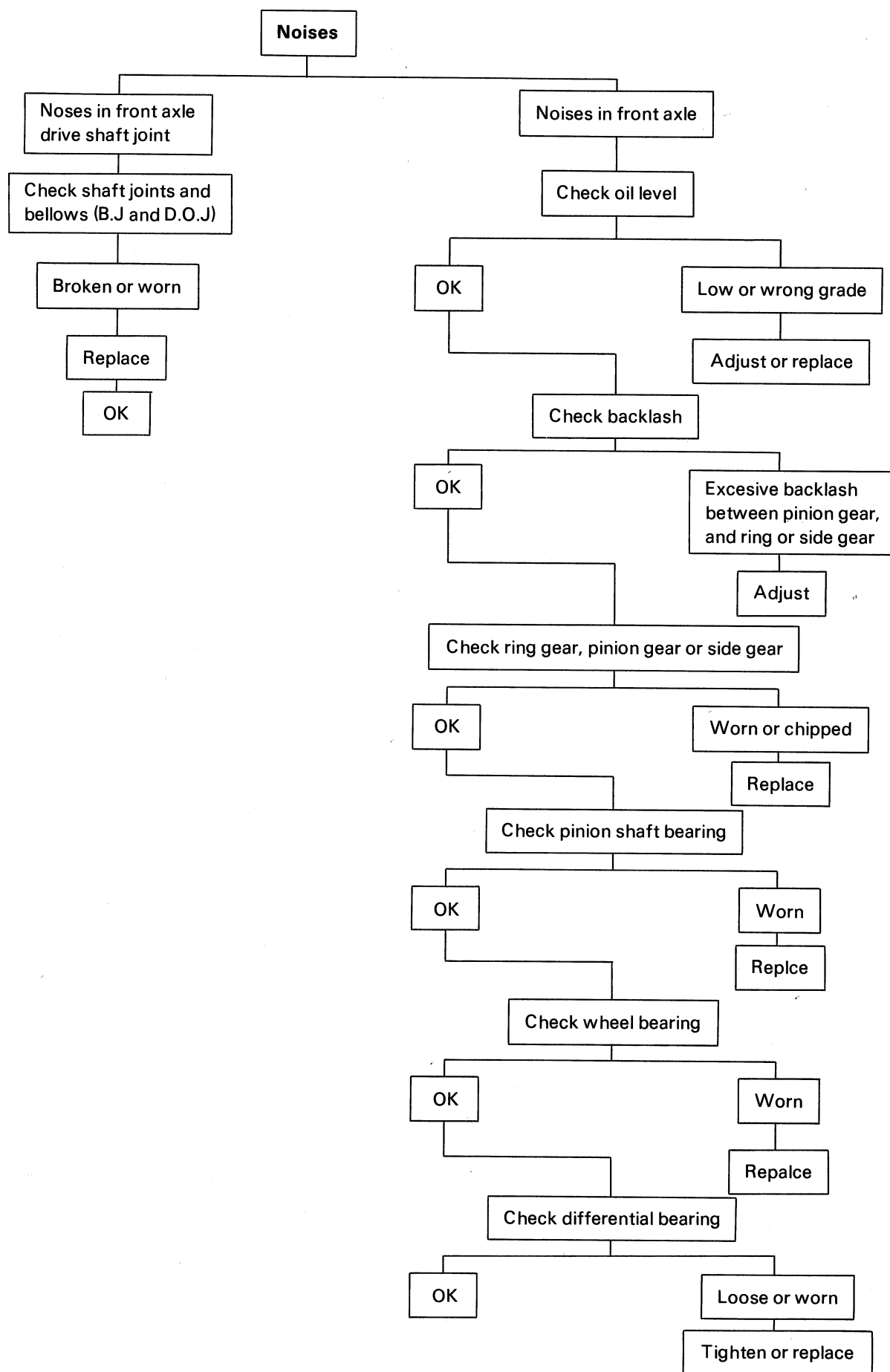
- (1) Attach a 1.49 mm (0.059 in.) snap ring to the groove on one end.
(2) Select the thickest snap ring which will fit into the groove at the other end.

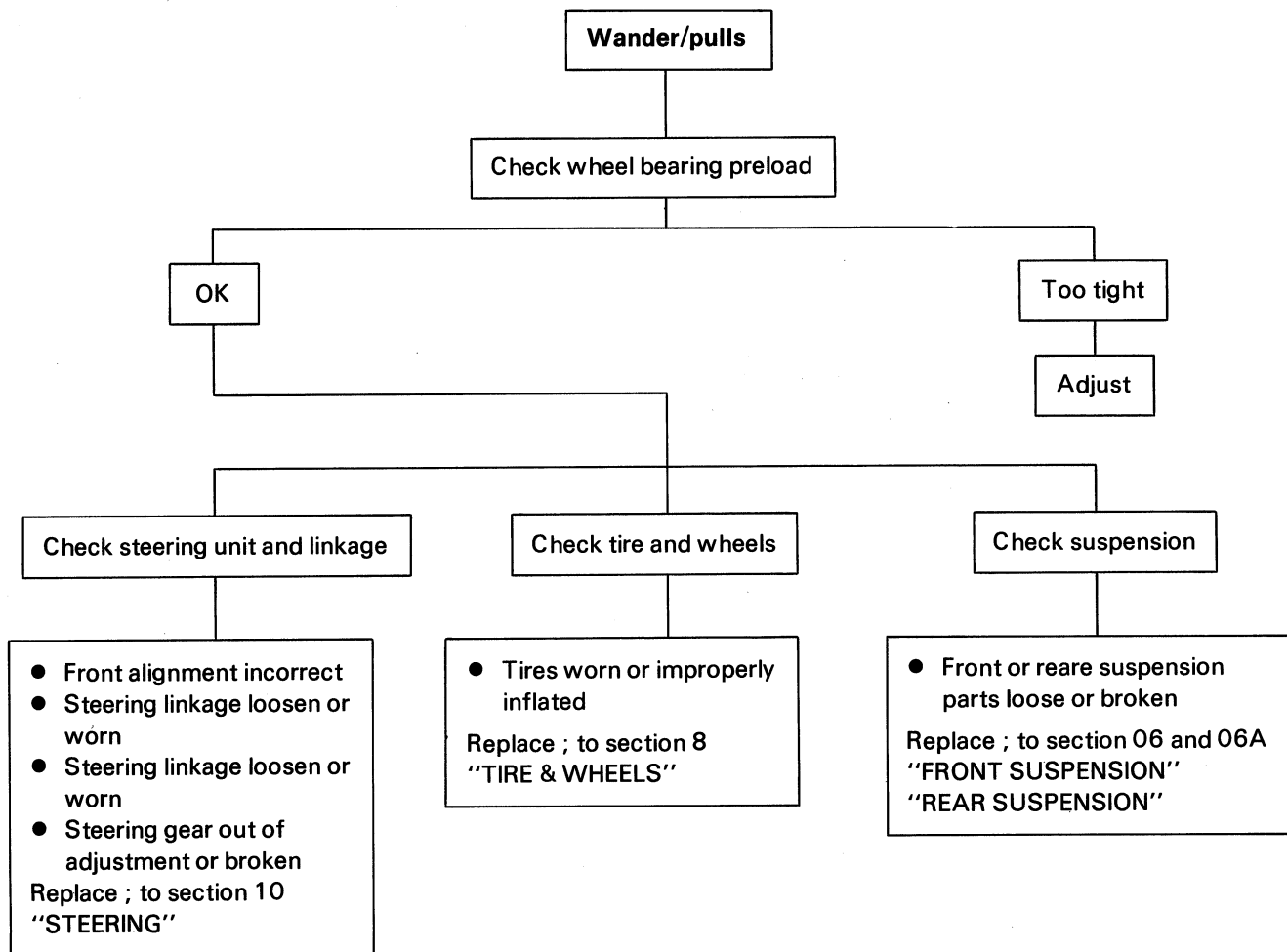
mm(in.)	
Snap ring thickness	
1.44	(0.057)
1.49	(0.059)
1.59	(0.063)

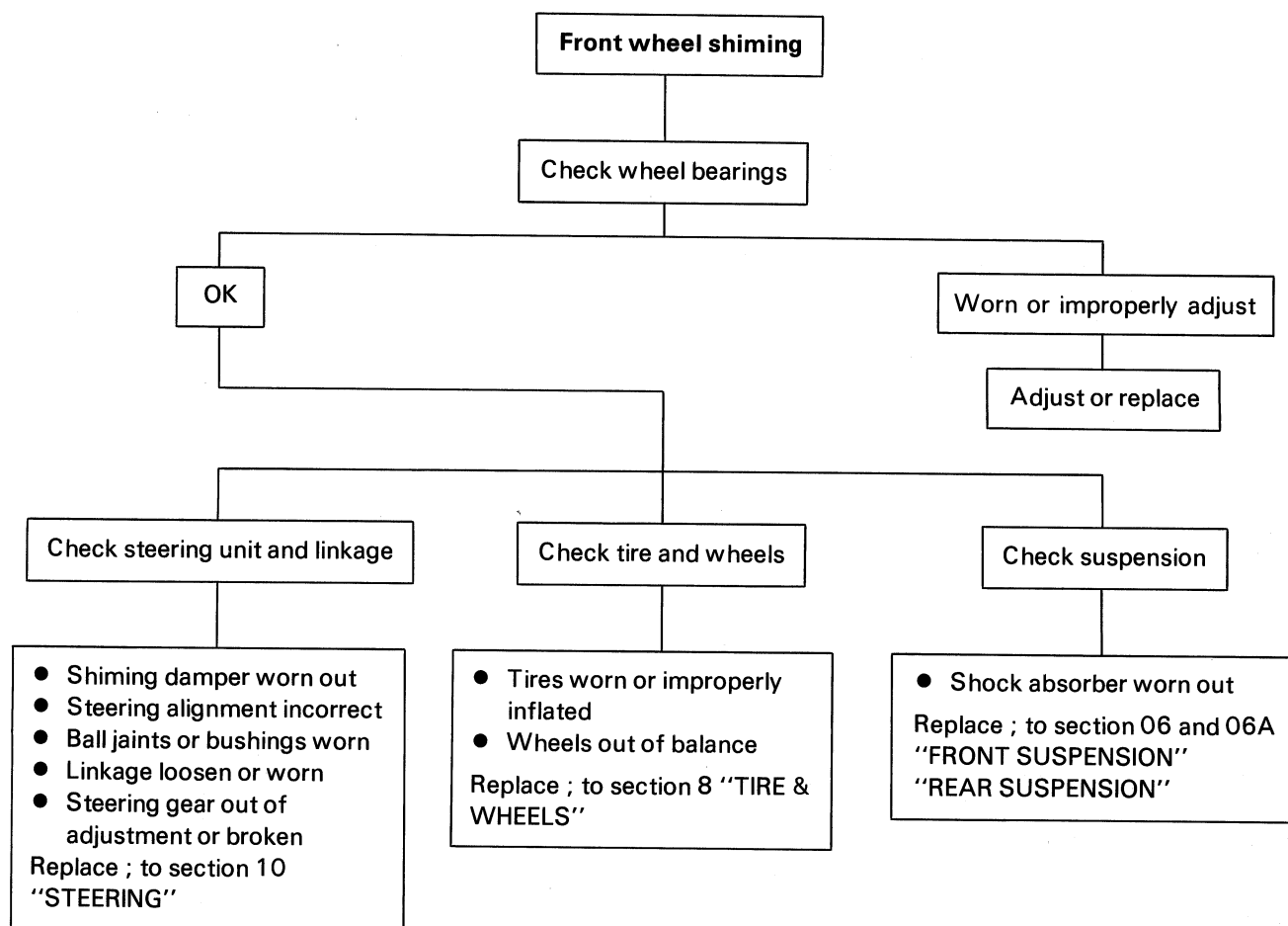
DIAGNOSIS

FRONT AXLE

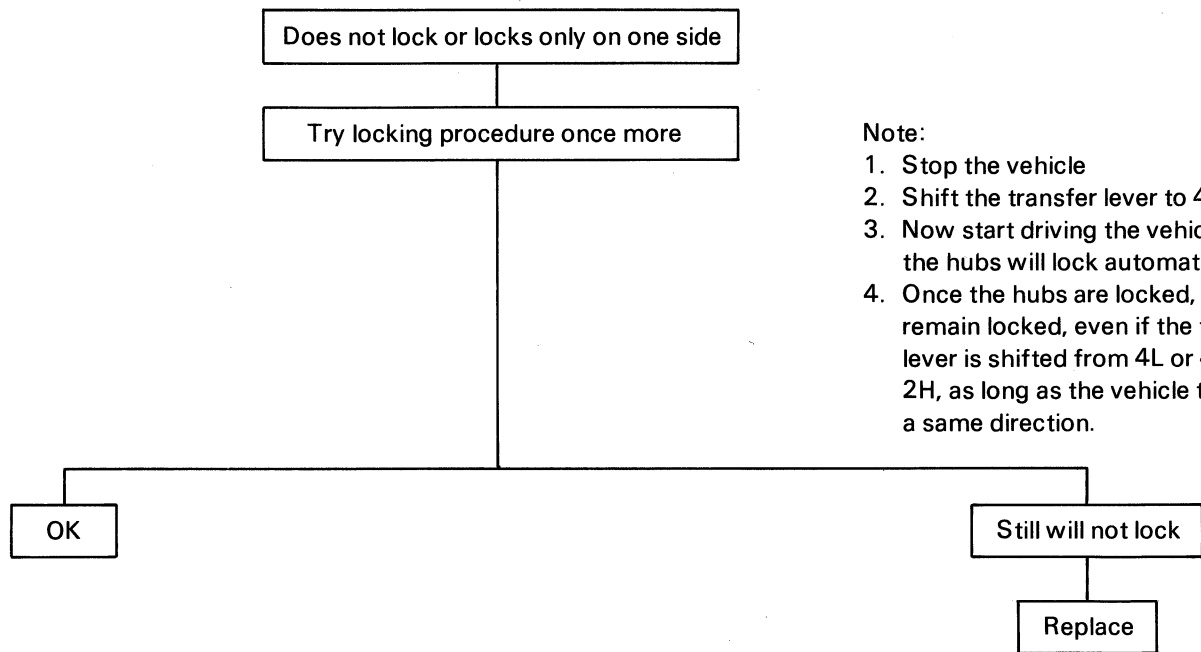






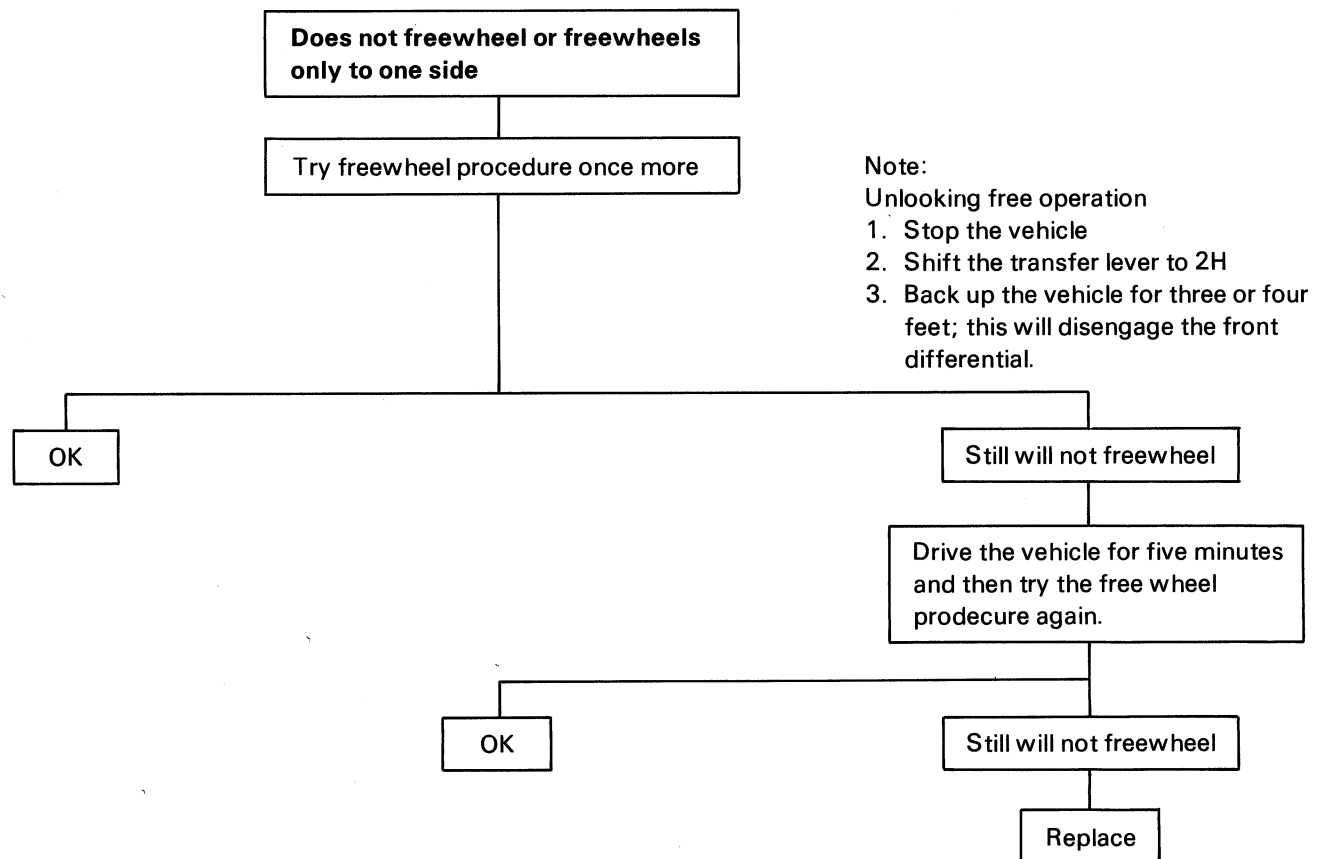


Automatic locking free wheel hubs



Note:

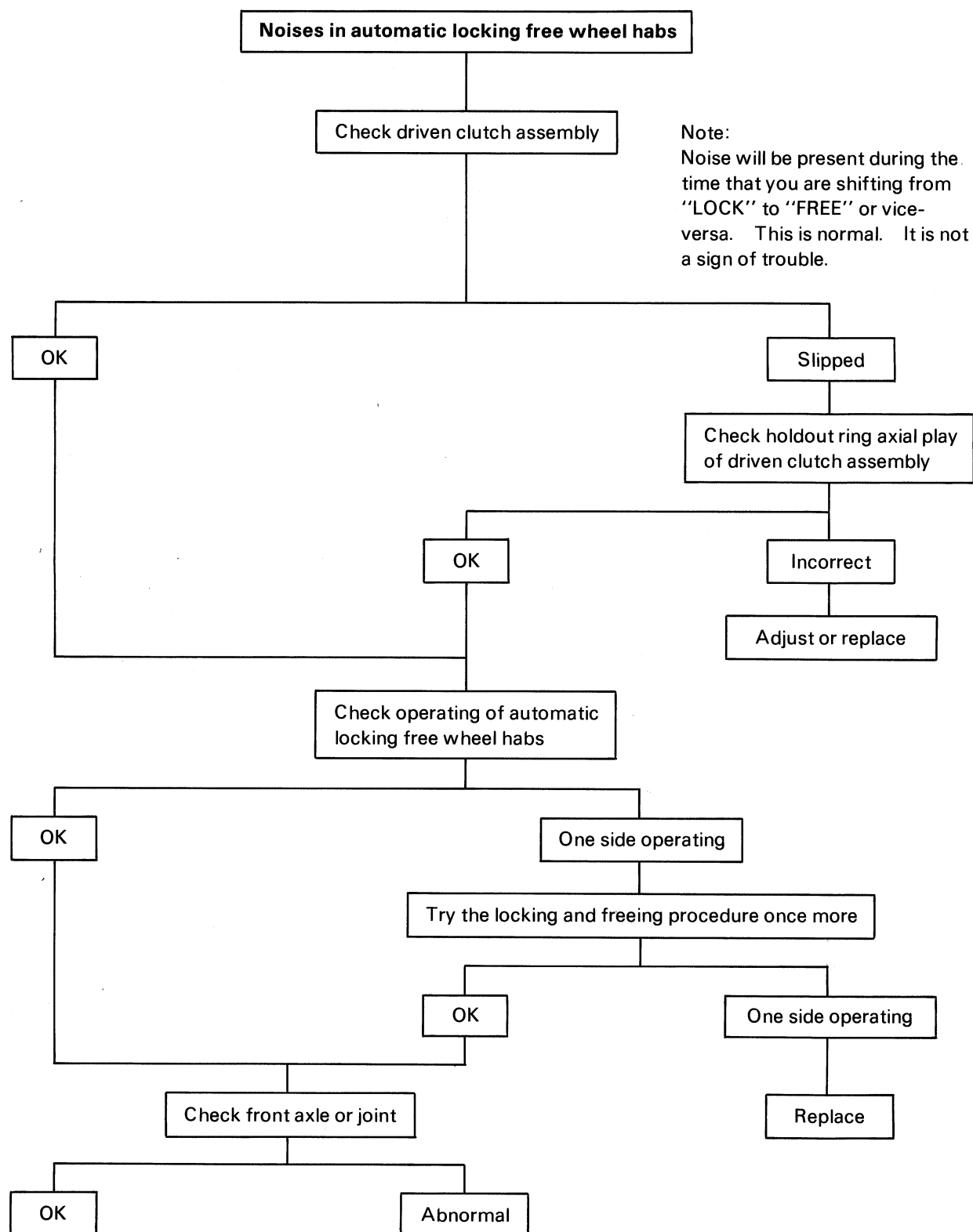
1. Stop the vehicle
2. Shift the transfer lever to 4H or 4L
3. Now start driving the vehicle and the hubs will lock automatically.
4. Once the hubs are locked, they will remain locked, even if the transfer lever is shifted from 4L or 4H into 2H, as long as the vehicle travels in a same direction.



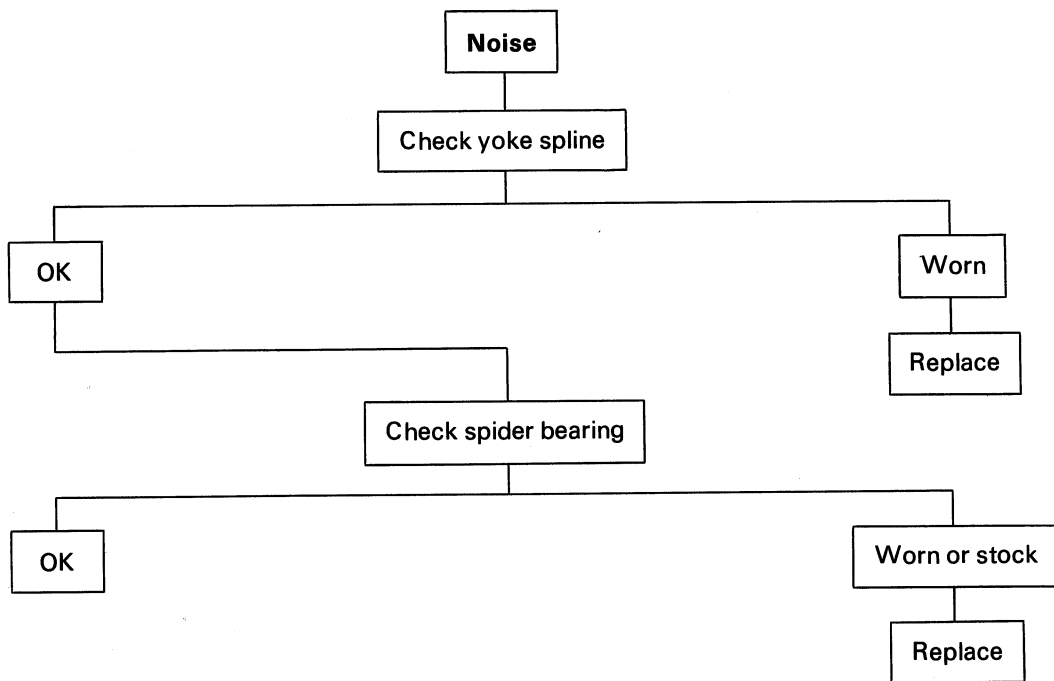
Note:

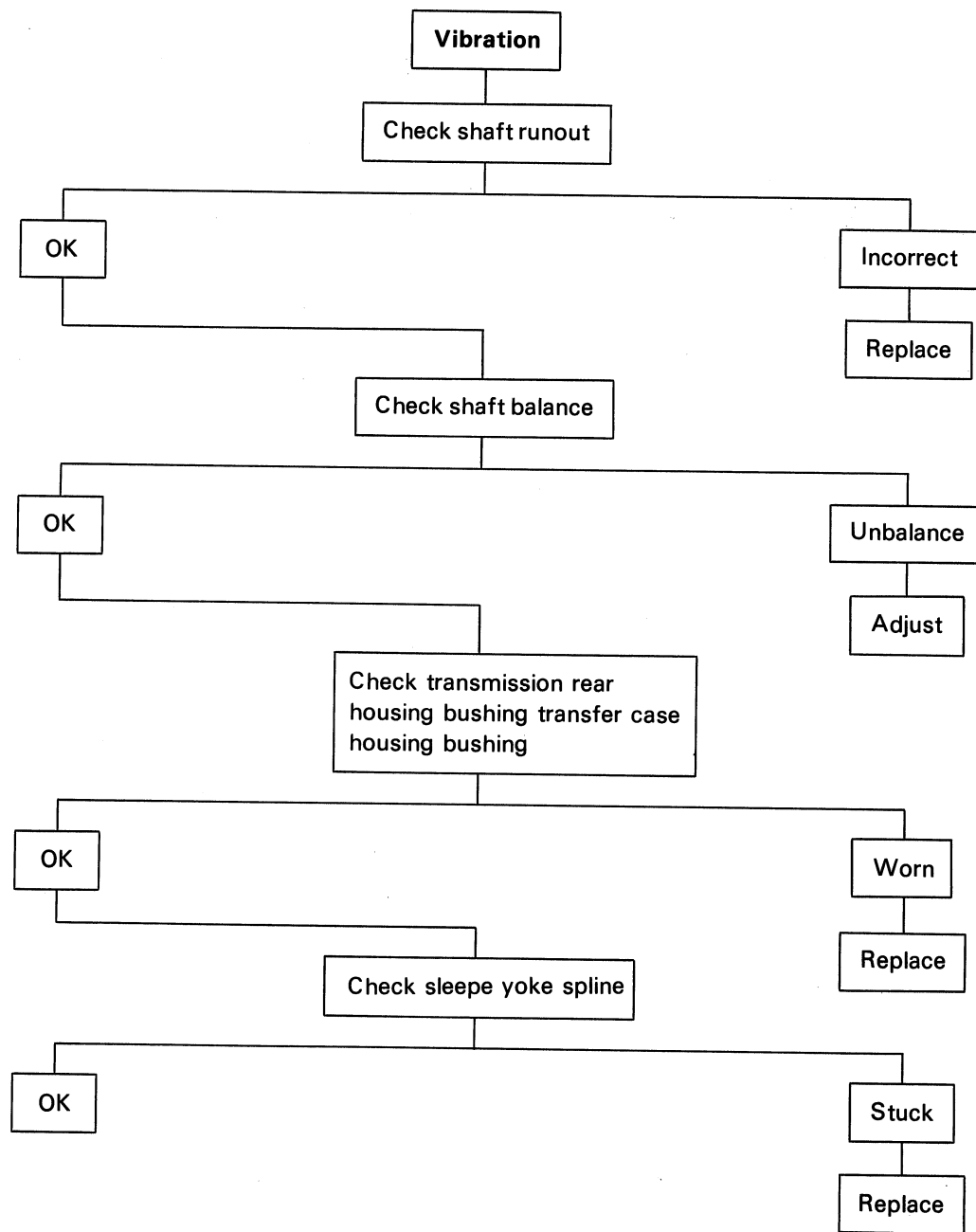
Unlocking free operation

1. Stop the vehicle
2. Shift the transfer lever to 2H
3. Back up the vehicle for three or four feet; this will disengage the front differential.

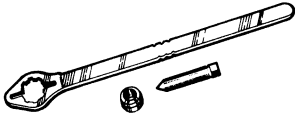
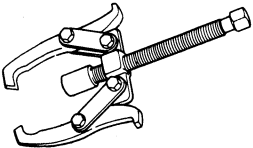
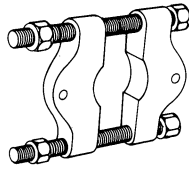
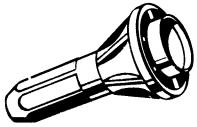
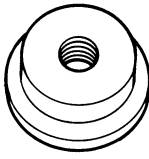
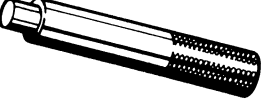
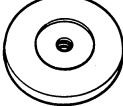


PROPELLER SHAFT

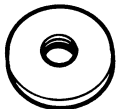
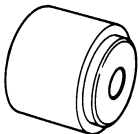
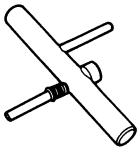
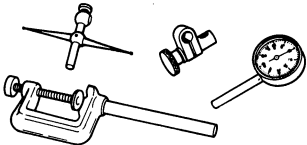
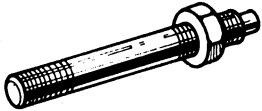
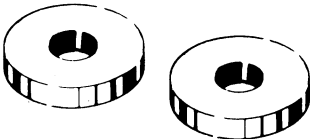
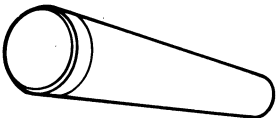
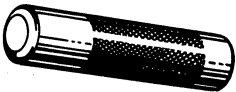
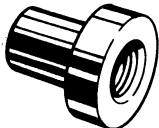


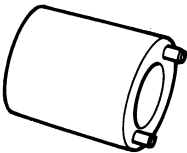
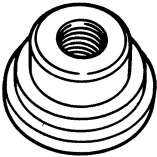
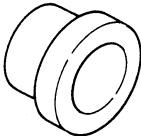
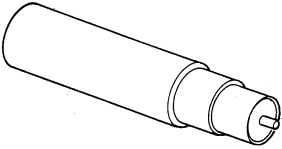


SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-8614-01	Pinion flange holder
		J-22888	Side bearing puller
		J-8107-2	Side bearing plug adapter
		J-22912-01	Rear pinion bearing remover
		J-26234	Pinion oil seal installer
		J-29038	Rear pinion bearing race installer
		J-29039	Front pinion bearing race installer
		J-8092	Driver handle
		J-23597-26	Gauge plate

07-62 FRONT AXLE AND FRONT PROPELLER SHAFT

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-23597-27	Pilot
		J-23597-28	Pilot
		J-23597-1	Arbor
		J-8001	Dial guage
		J-21777-43	Stud & Nut
		J-23597-4	Disc (2 required)
		J-6133-01	Rear pinion bearing installer
		J-6403-C	Bearing shield installer pinion flange installer
		J-29036	Differential side bearing installer

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-29020-A	Front hub nut wrench
		J-29015	Front hub inner bearing installer
		J-29016	Front hub outer bearing race installer
		J-29017	Wheel hub oil seal & ring installer
		J-33935	Automatic locking hub gauge
		J-33934	Automatic locking hub shims installer
		J-34357	Dummy nut

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

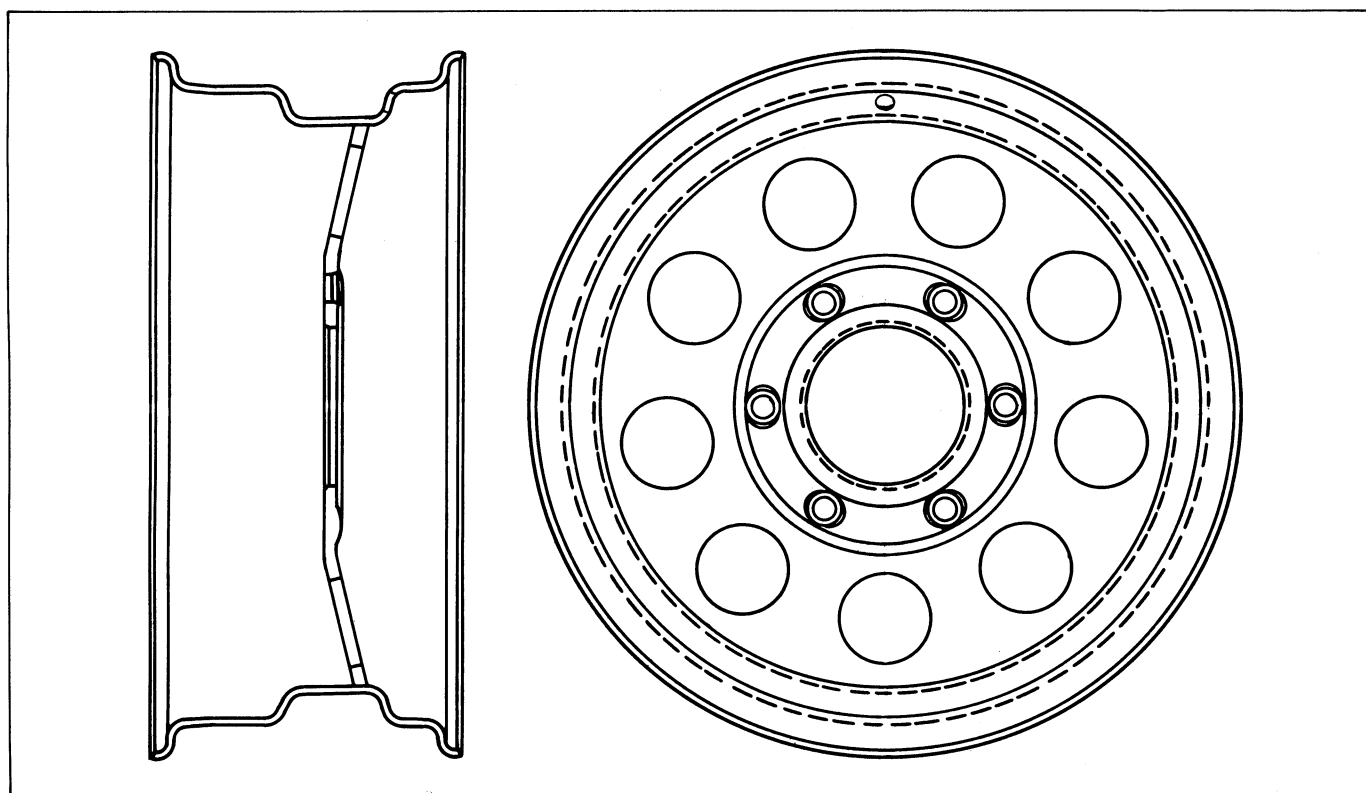
SECTION 08

WHEELS AND TIRES

INDEX

CONTENTS	PAGE
General description	08—1
Main data and specifications	08—2
Major parts ; fixing nuts and bolts	08—2
Disassembly and reassembly	08—3
Inspection and repair	08—4
Diagnosis	08—6

GENERAL DESCRIPTION

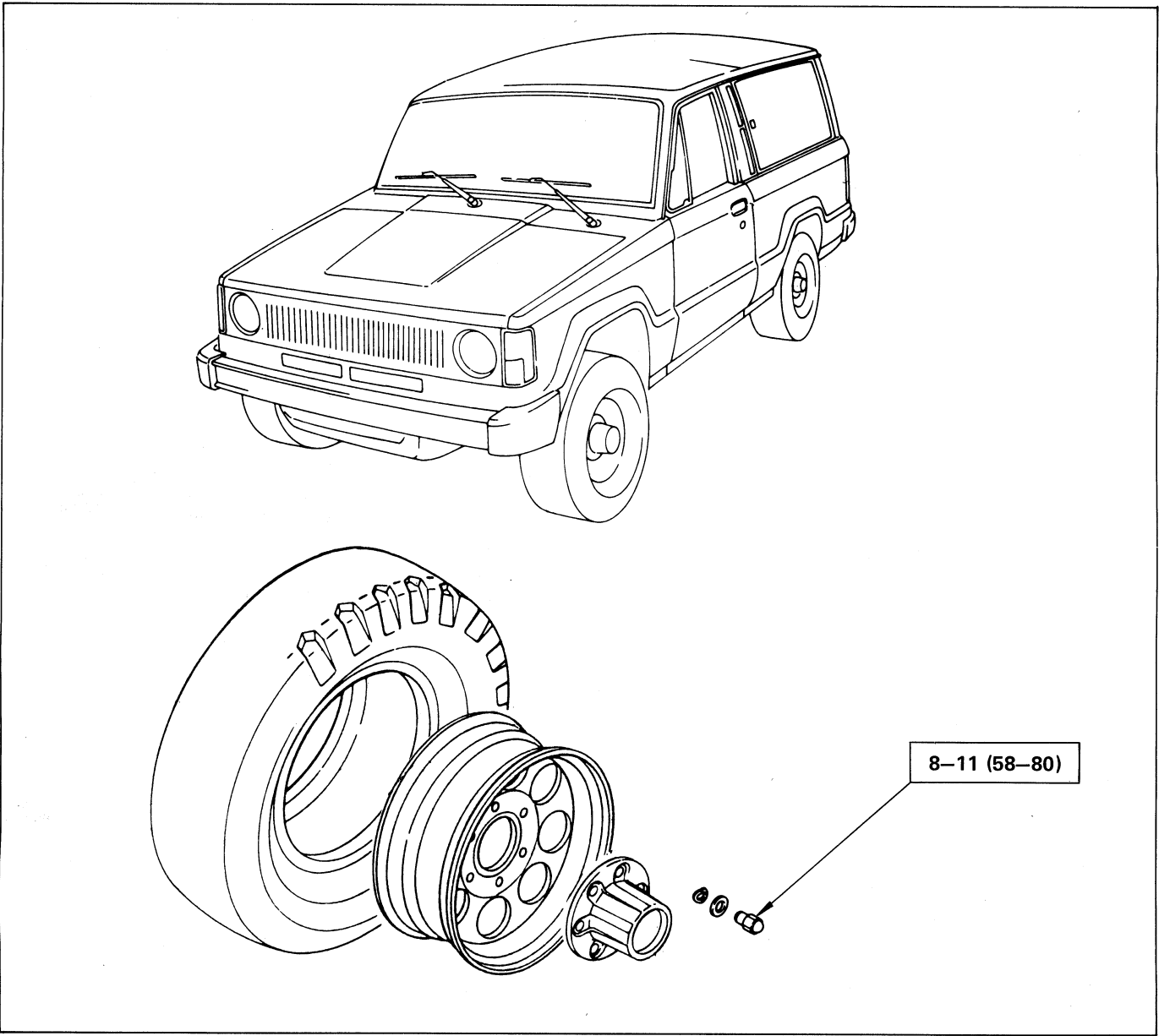


MAIN DATA AND SPECIFICATIONS

Disc wheels		
Size		6JJ x 15
Offset	mm(in.)	7.5 (0.296)
P.C.D.	mm(in.)	139.7 (5.504)
Standard tires		
Size		P225/75R-15
Pressure	kg/cm ² (psi)	1.8 (26)

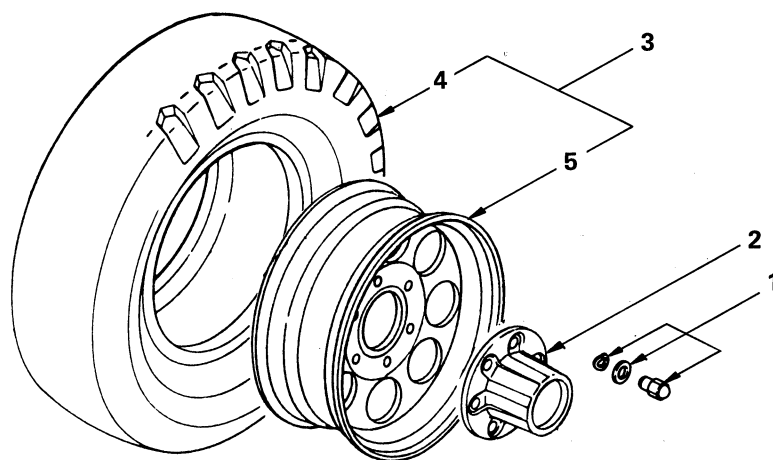
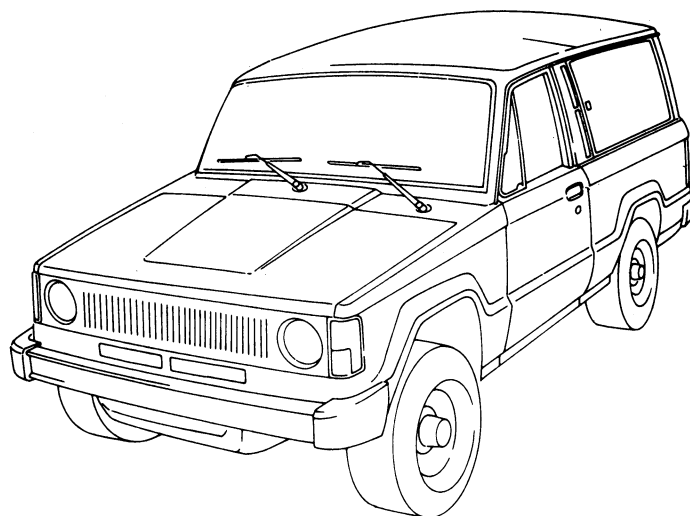
MAJOR PARTS ; FIXING NUTS AND BOLTS

kg-m(ft.lbs.)





DISASSEMBLY AND REASSEMBLY



Disassembly Steps

1. Wheel nut
2. Wheel cap
3. Disc wheel and tire assembly
4. Tire assembly
5. Disc wheel assembly

Reassembly steps

5. Disc wheel assembly
- ▲ 4. Tire assembly
- ▲ 3. Disc wheel and tire assembly
2. Wheel cap
- ▲ 1. Wheel nut



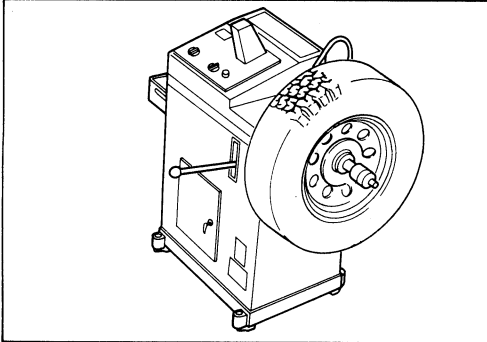
INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



Visual check

Inspect all disassembled parts for wear, damage, or any other abnormal conditions.



Measure wheel unbalance

Using tires and wheels balancing equipment.

Install on the side rim of the disc wheel a balance weight which is equal in weight to the amount of unbalance.

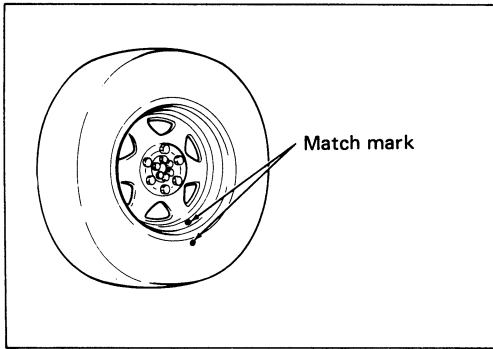


Important operations — Reassembly

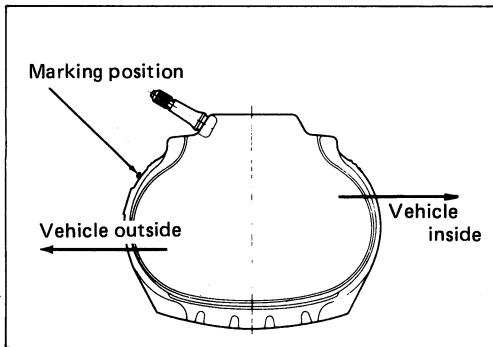
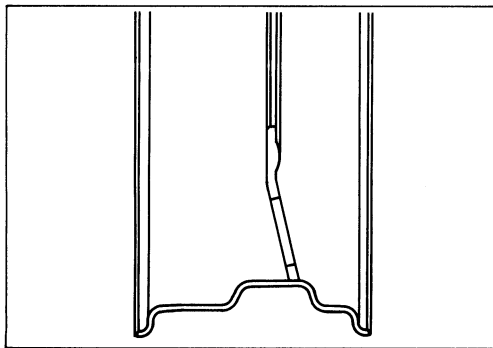


4. Tire assembly

Align the valve assembly and tire balancing match marks (8 mm diameter paint mark).

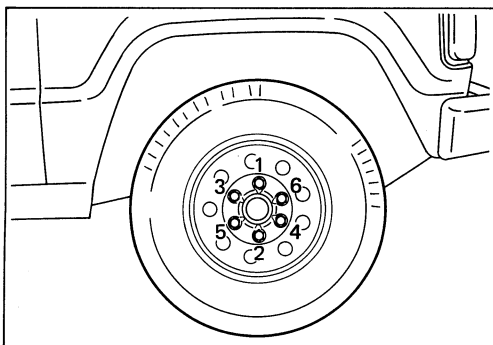


3. Disc wheel and tire assembly



1. Wheel nut

Tighten the wheel nuts in numerical order.

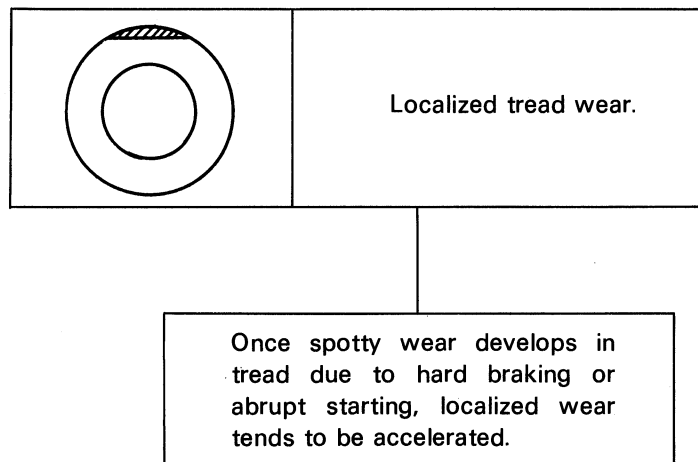
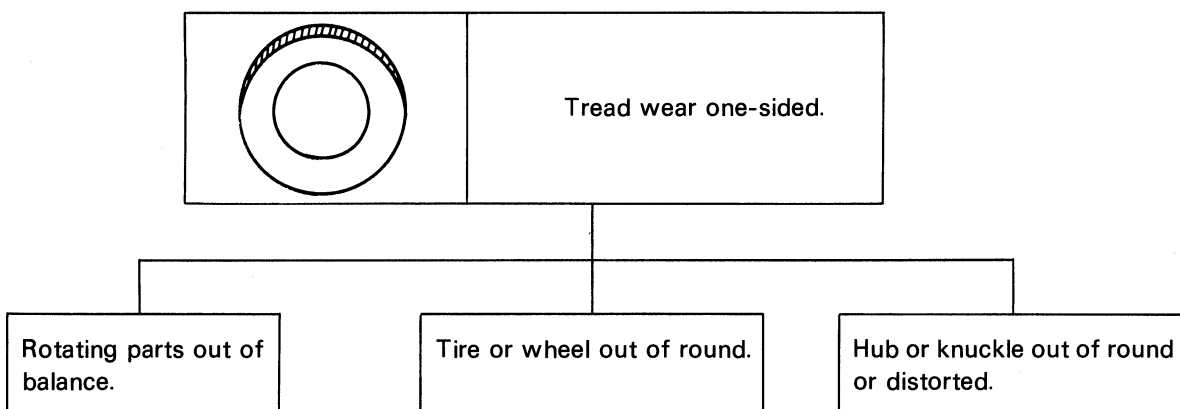
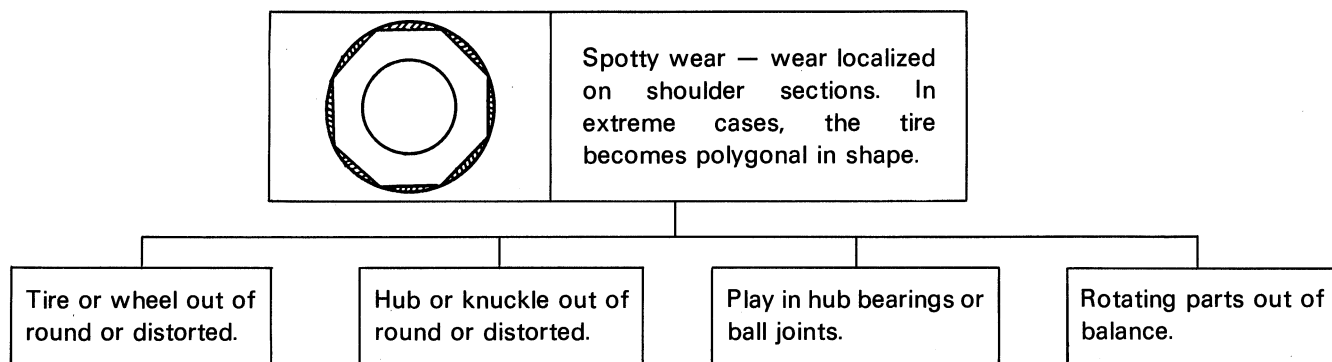


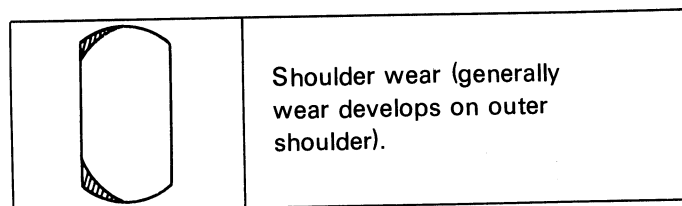
Torque kg-m(ft.lbs.)	8 — 11 (58 — 80)
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DIAGNOSIS

Typical examples of abnormal tire tread wear and major causes:

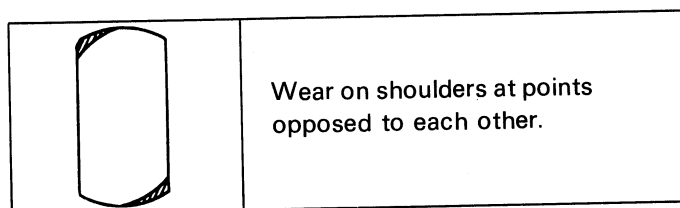
CAUTION: Similar wear patterns can be caused by worn suspension parts, misalignment or wheels and tires, and other suspension related problems.





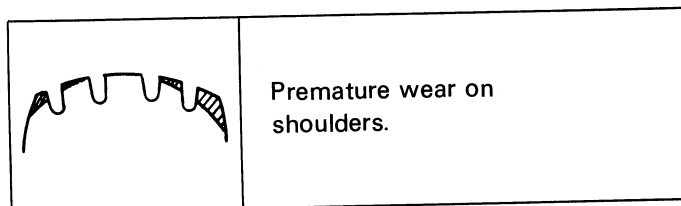
Camber or toe-in incorrect.

Shoulder wear caused by repeated hard-cornering.

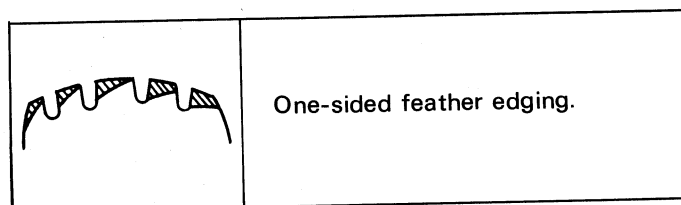


Tire or wheel out of round or distorted.

Play in bearings or ball joint.



Flexing of tire excessive due to under-inflation.

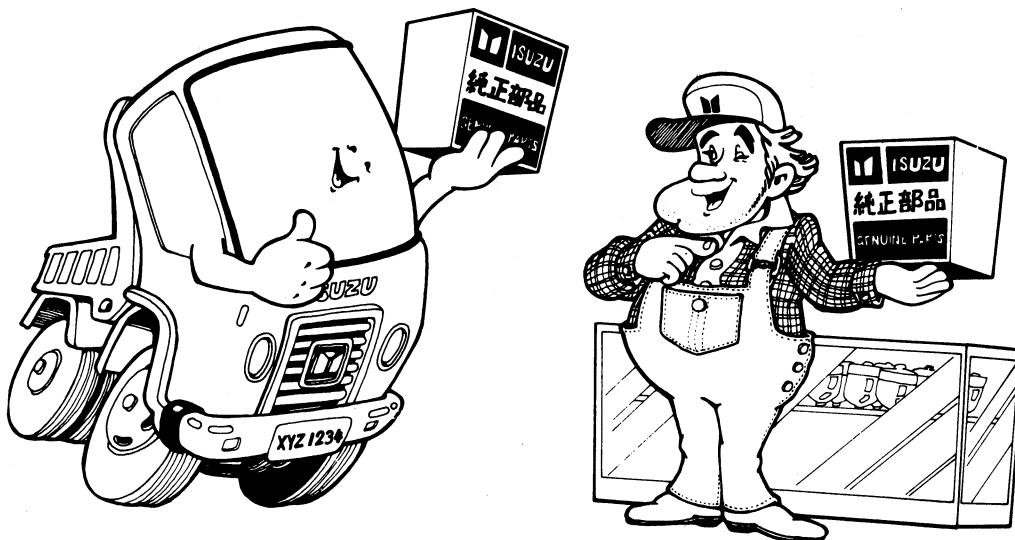


Wear caused by repeated hard-cornering.

Camber or toe-in incorrect.

MEMO

"QUALITY PARTS YOU CAN TRUST"



SECTION 09

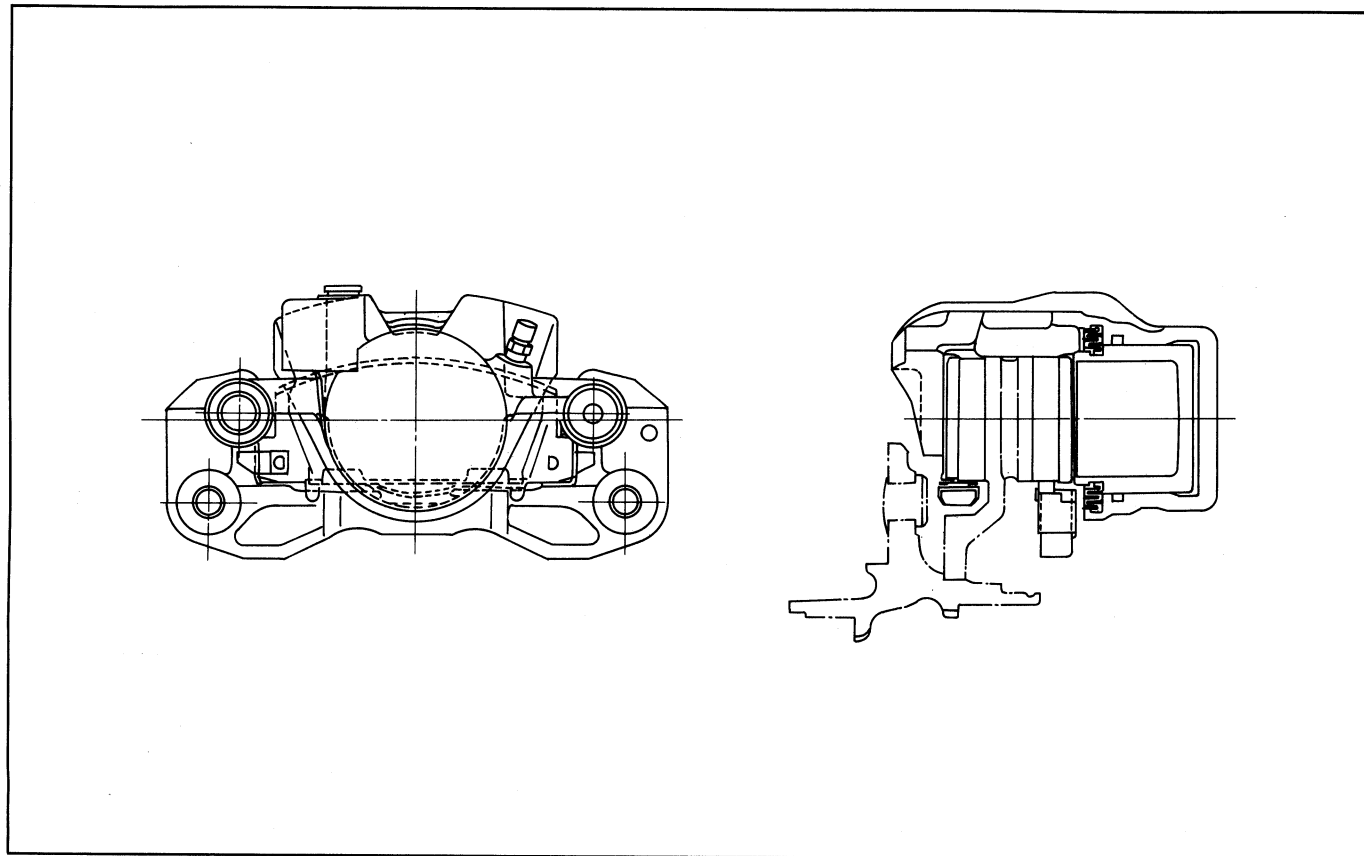
BRAKES

INDEX

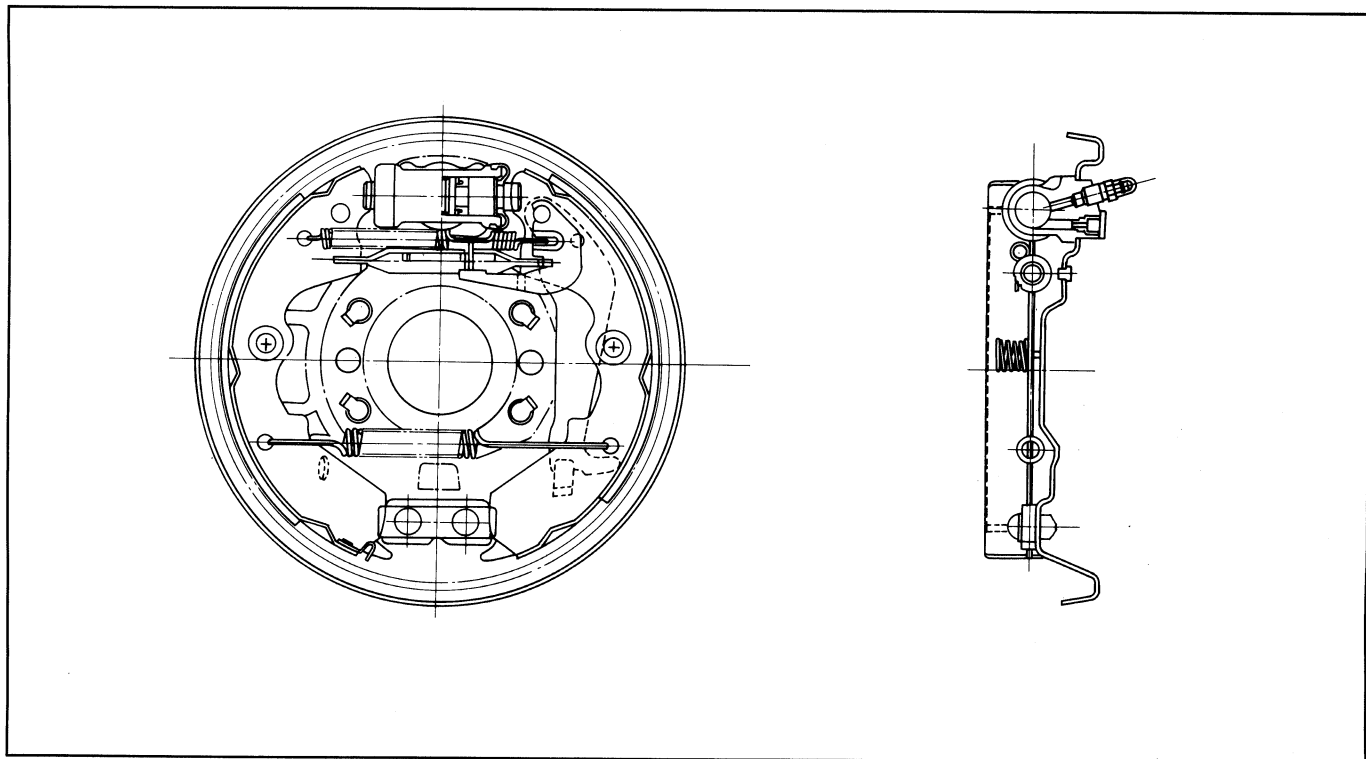
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Main data and specifications	09— 5
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Rear brake assembly	09—19
Brake control	09—27
Master cylinder assembly	09—29
Master vac	09—30
Parking brake	09—43
Diagnosis	09—49
Special tools	09—50

GENERAL DESCRIPTION

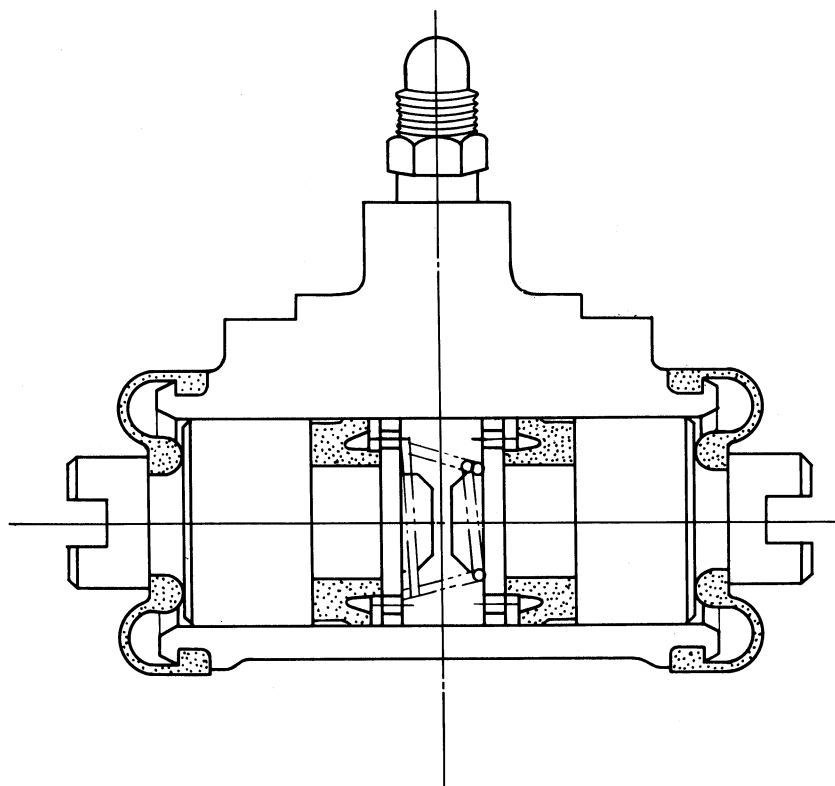
FRONT DISC BRAKE



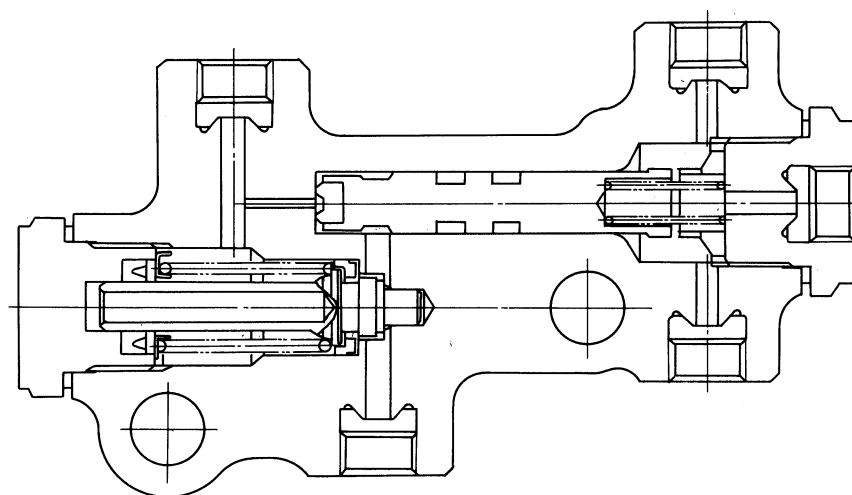
REAR DRUM BRAKE



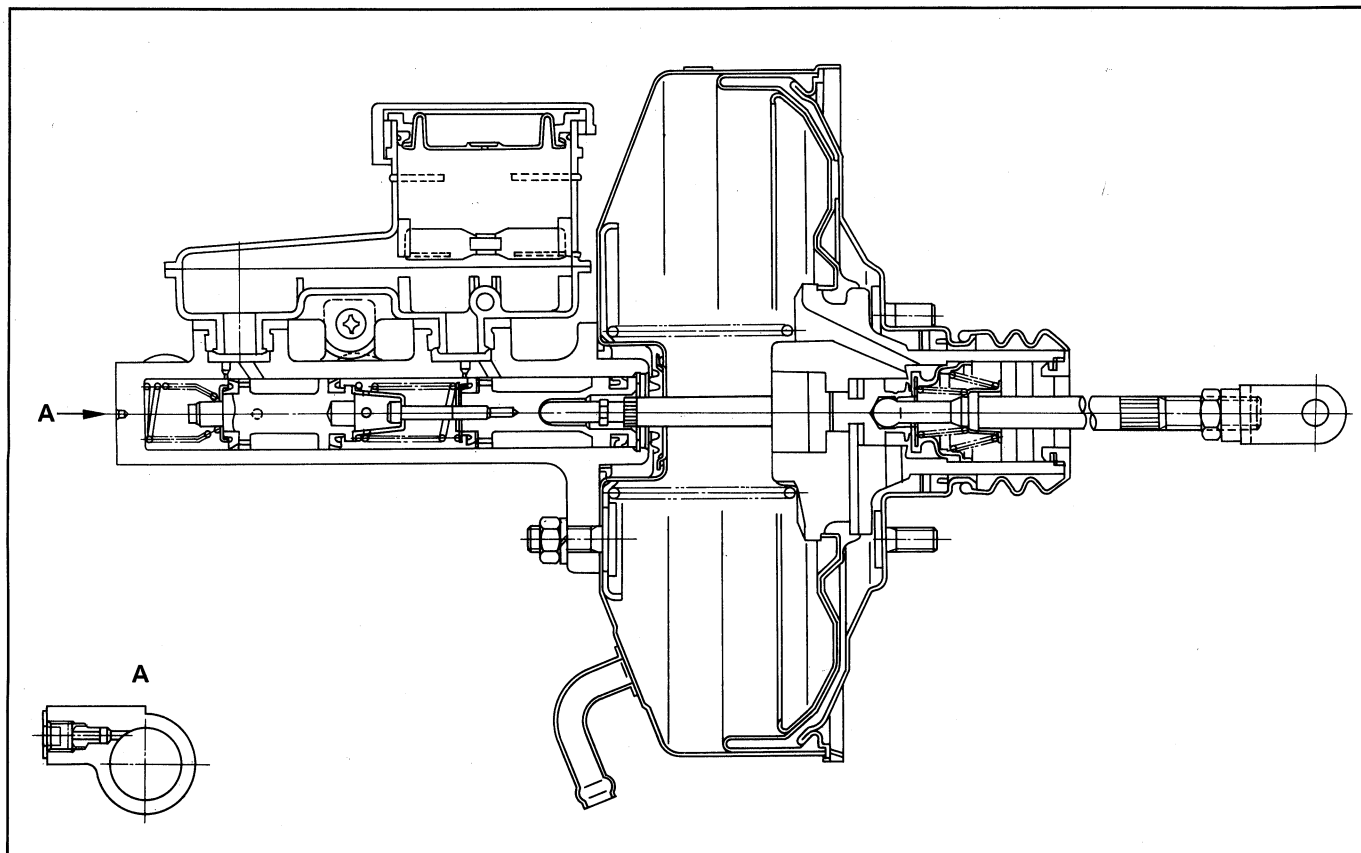
REAR WHEEL CYLINDER



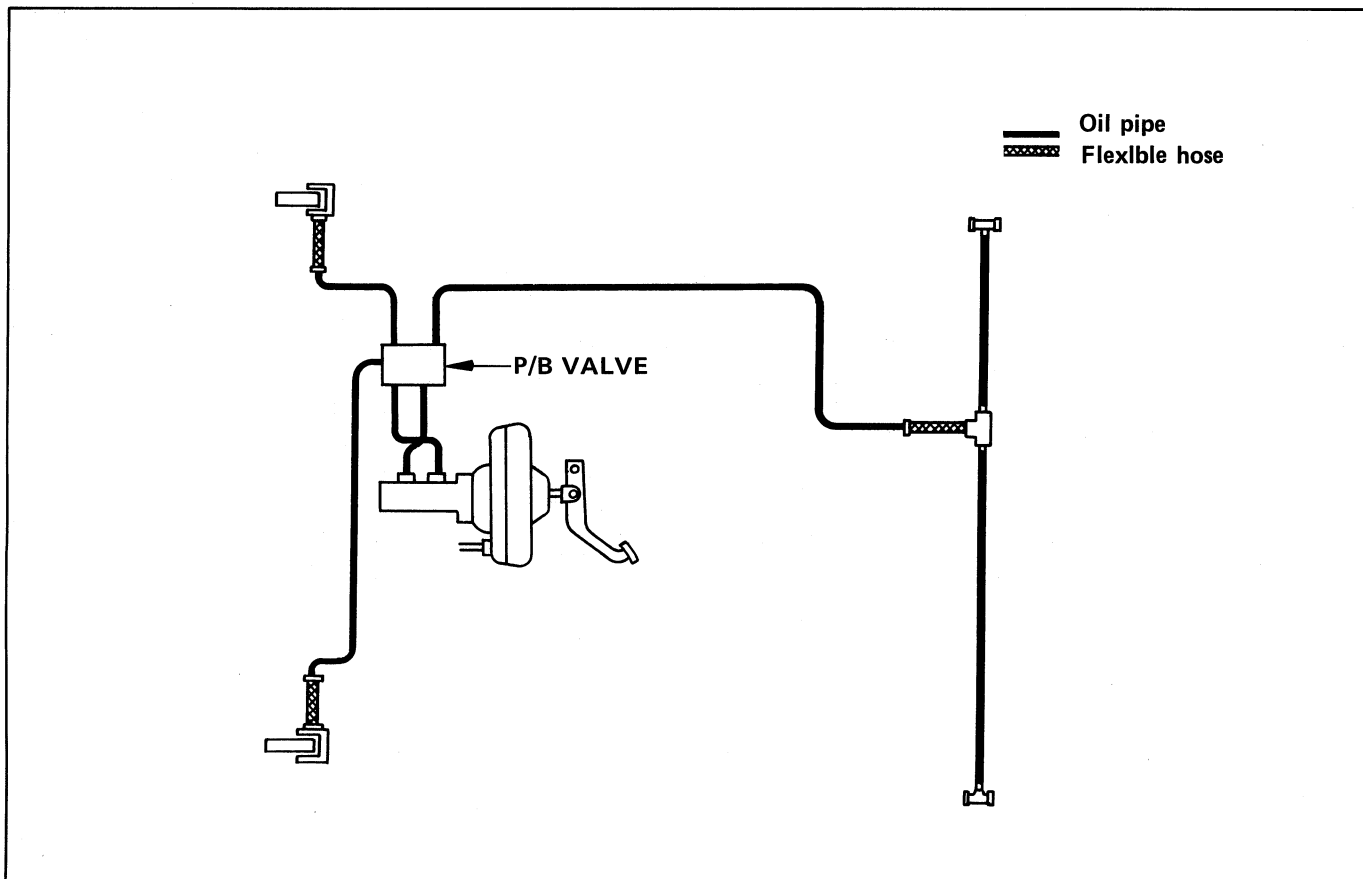
PROPORTIONING AND BYPASS VALVE



MASTER-VAC WITH MASTER CYLINDER



PIPING DIAGRAM

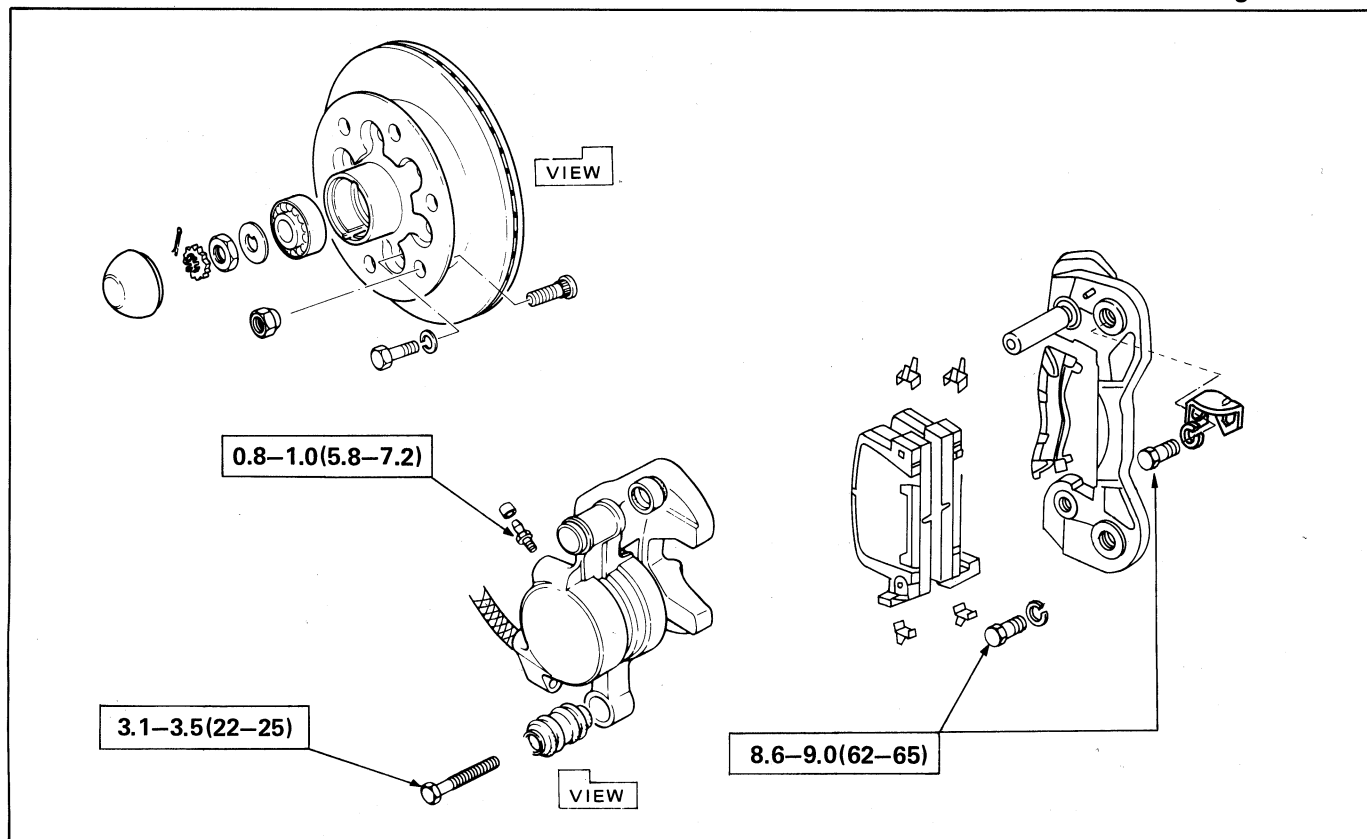


MAJOR PARTS ; FIXING NUTS AND BOLTS

BRAKE

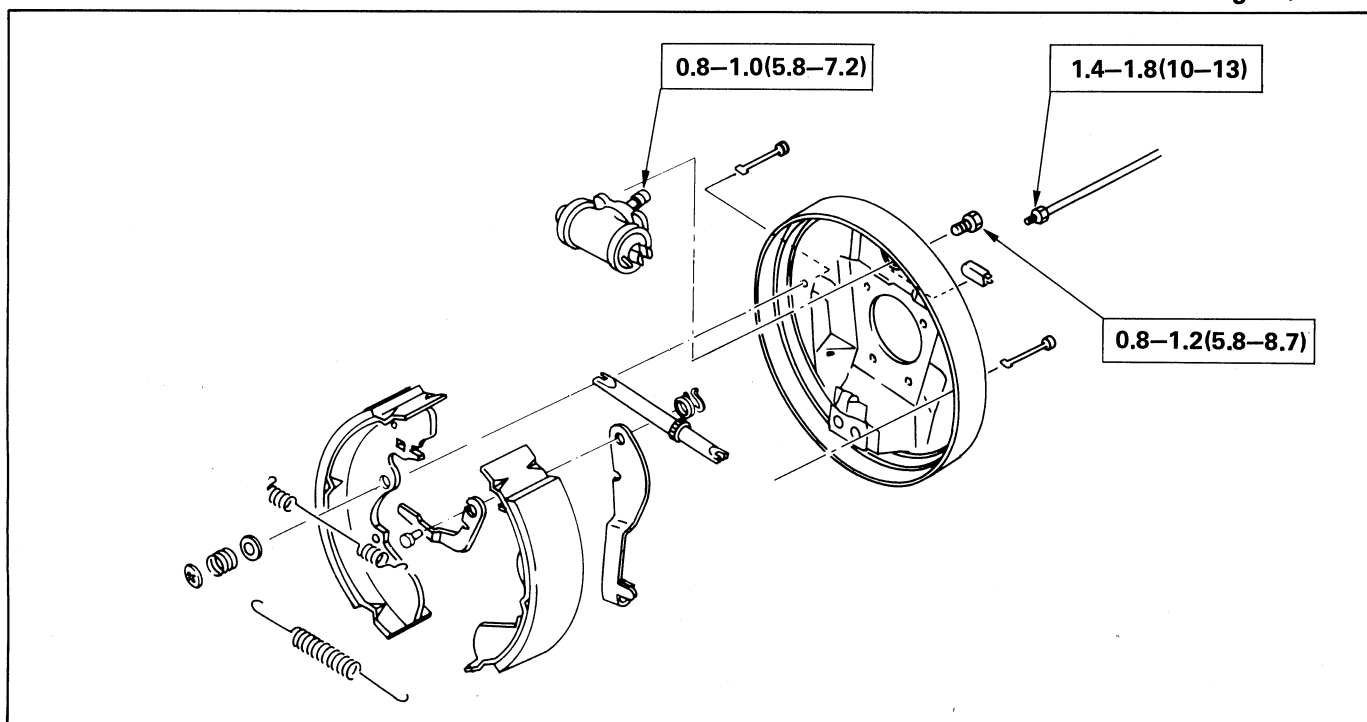
Front wheel brakes

kg-m(ft.lbs.)



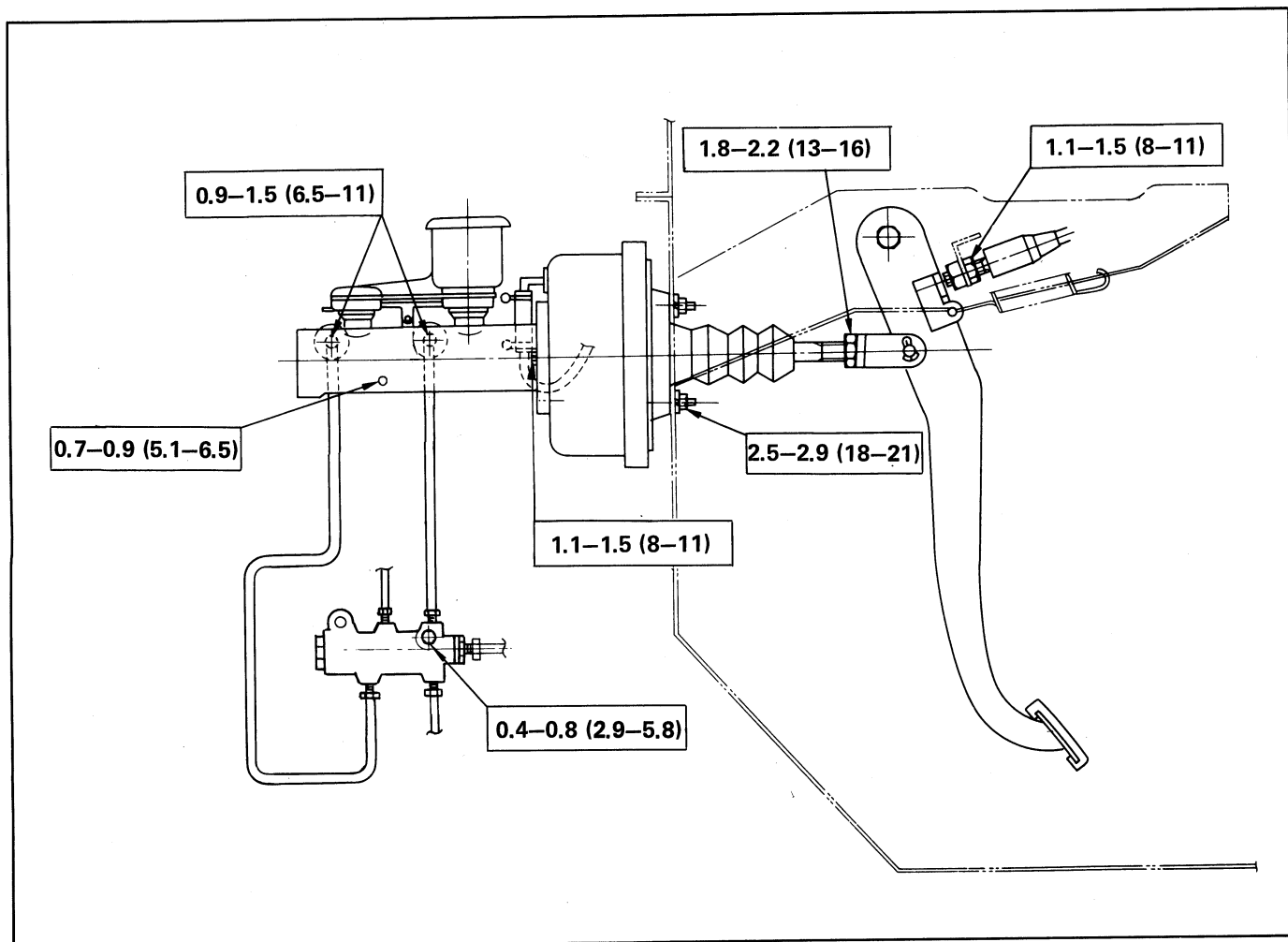
Rear wheel brakes

kg-m(ft.lbs.)



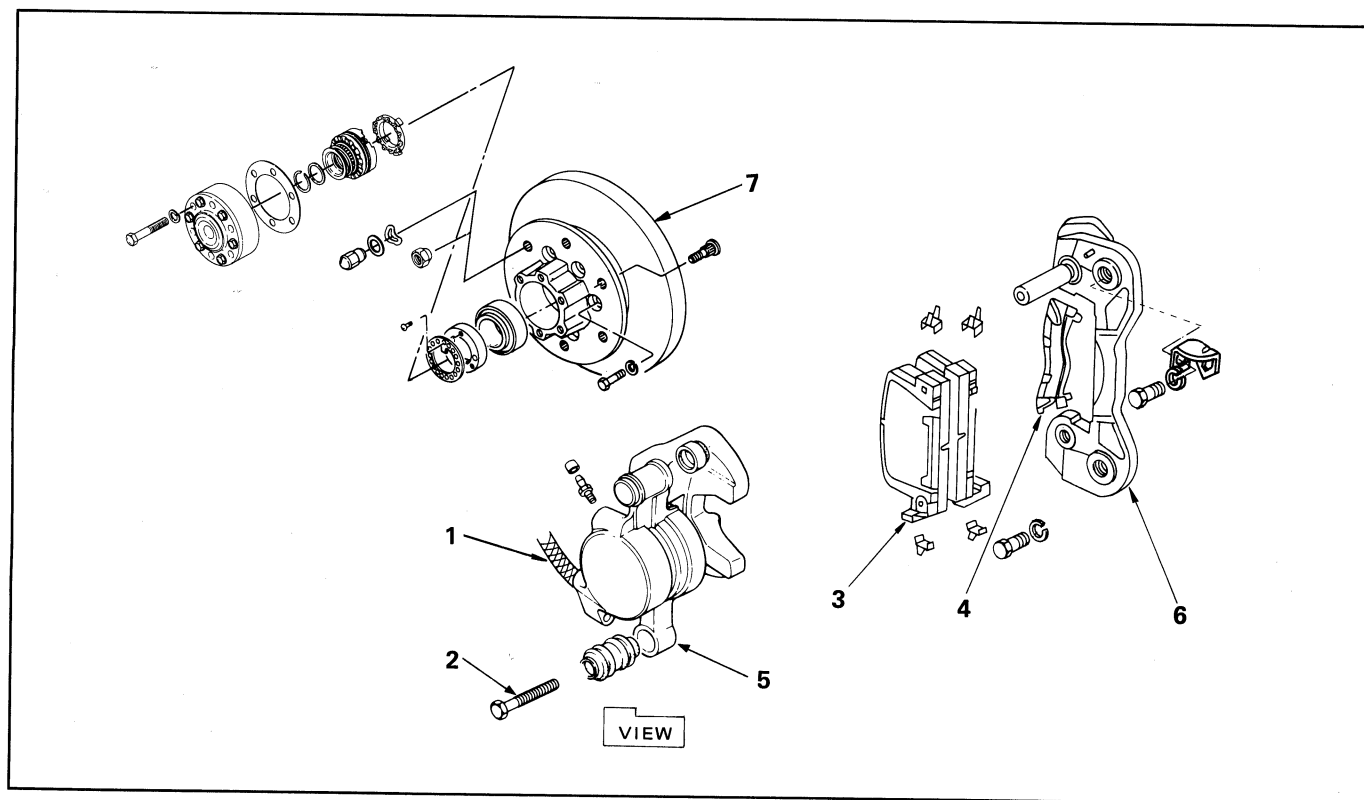
Vacuum servo with master cylinder and brake pedal

kg-m(ft.lbs.)



FRONT BRAKE ASSEMBLY

REMOVAL AND INSTALLATION



Removal steps

- ▲ 1. Brake flexible hose
- ▲ 2. Lock bolt
- ▲ 3. Pad assembly with shim
- ▲ 4. Clip: pad
- ▲ 5. Caliper assembly
- ▲ 6. Support bracket
- ▲ 7. Front hub and disc assembly

Installation steps

- ▲ 7. Front hub and disc assembly
- ▲ 6. Support bracket
- ▲ 5. Caliper assembly
- ▲ 4. Clip: pad
- ▲ 3. Pad assembly with shim
- ▲ 2. Lock bolt
- ▲ 1. Brake flexible hose

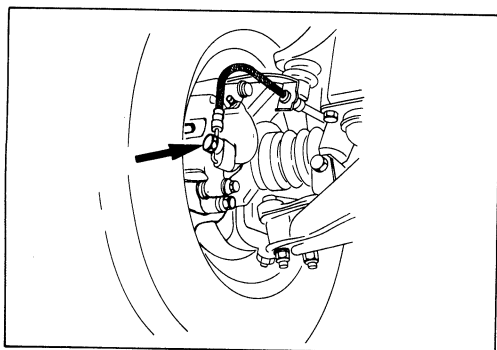


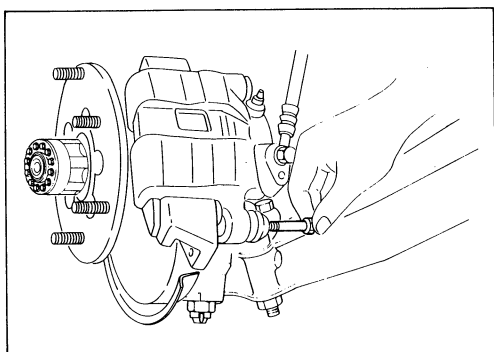
Important operations — Removal

1. Brake flexible hose

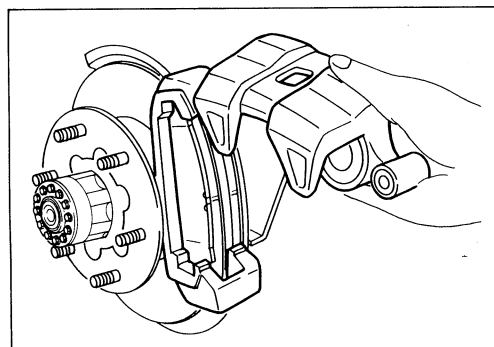
Disconnect the brake flexible hose from the caliper.

After disconnecting the flexible hose, cap or tape the openings to prevent entry of foreign material.

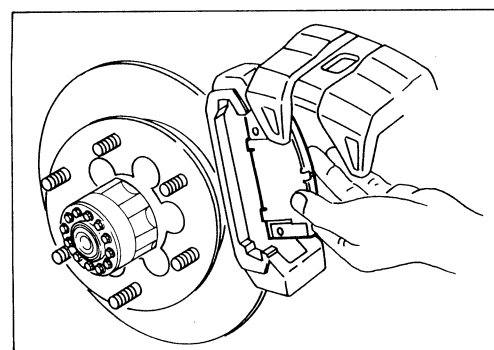


**2. Lock bolt**

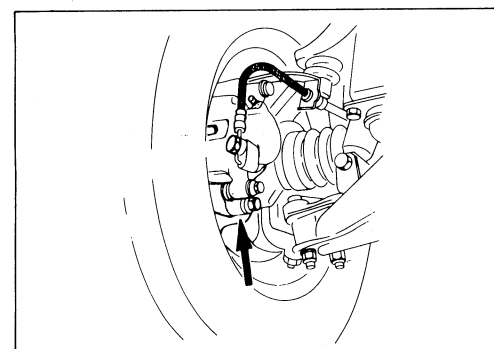
Remove the lock bolt from the caliper.

**3. Pad assembly with shim**

Rotate the caliper upward.



Mark the lining location if they are to be reinstalled.

**6. Support bracket**

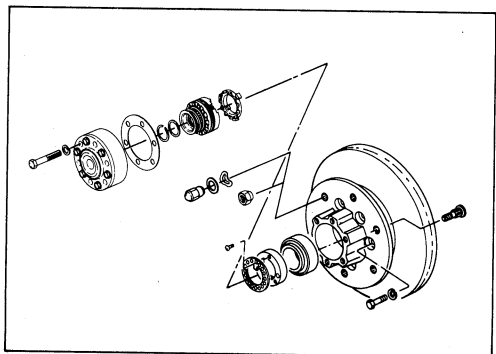
When removing, exercise care not to damage the brake flexible hose.

7. Front hub and disc assembly

For the removal procedure, refer to Section-07 "Front axle and suspension" for the hub and disc disassembly procedure.

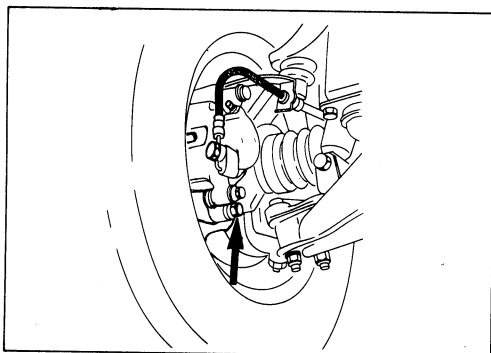


Important operations — Installation



7. Front hub and disc assembly

For the installation procedure, refer to Section-07 "Front axle and suspension" for the front hub and disc reassembly procedure.

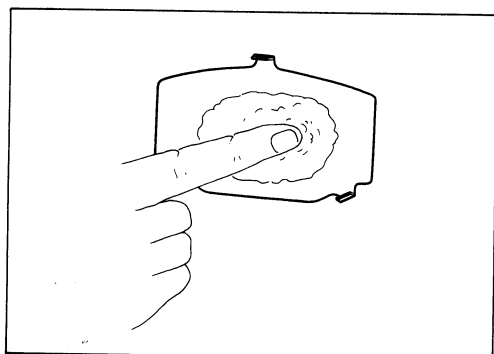


6. Support bracket

Torque	kg-m(ft.lbs.)	8.6 — 9.0 (62 — 65)
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4. Clip ; pad

Install with new parts if necessary.

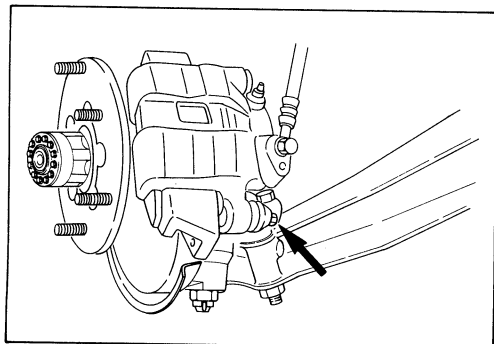


3. Pad assembly with shim

If the original linings are being reinstalled, they must be installed in their original positions (as marked at removal).

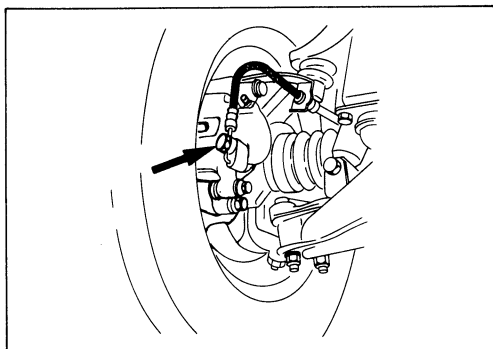


Apply DELCO brake lube No. 5450032 (or equivalent) to the shim.



2. Lock bolt

Torque	kg-m(ft.lbs.)	3.1 — 3.5 (22 — 25)
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1. Brake flexible hose

Torque	kg-m(ft.lbs.)	3.3 — 3.7 (24 — 27)
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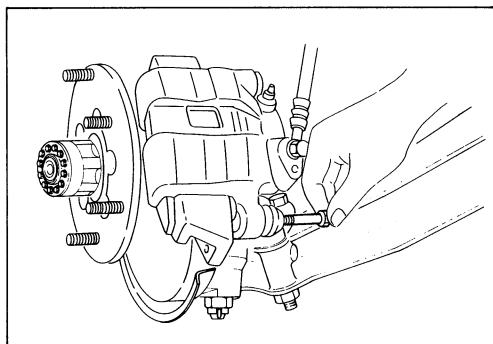
REMOVAL AND INSTALLATION OF DISC PAD



Removal steps

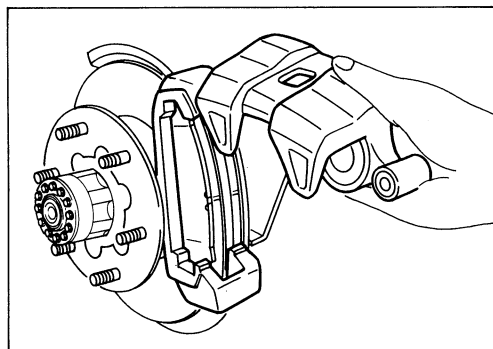
1. Lock bolt

Remove the lock bolt from the caliper.



2. Rotate the caliper upward

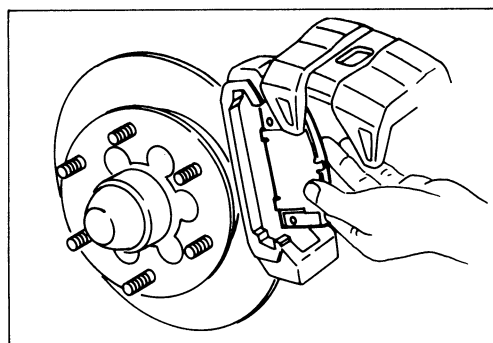
Remove the caliper from the support and wire the caliper to the upper link or the frame.

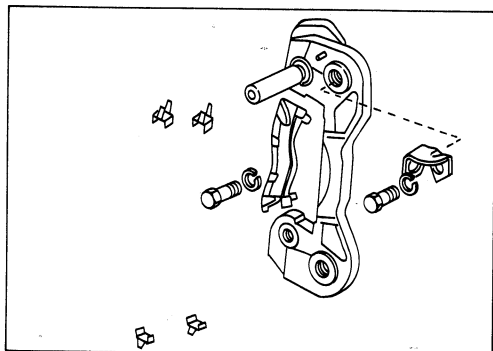


3. Pad assembly with shim

Remove the pad assembly with shim.

Mark the pad locations if they are to be reinstalled.





4. Clip ; pad

Discard the used clip and install a new one.



Important operation

2. Rotate the caliper upward

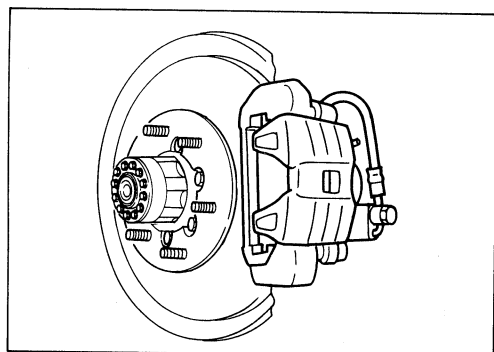
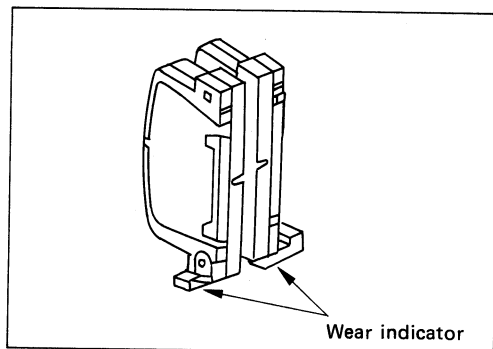
Do not damage the flexible hose by twisting or pulling it.



Installation steps

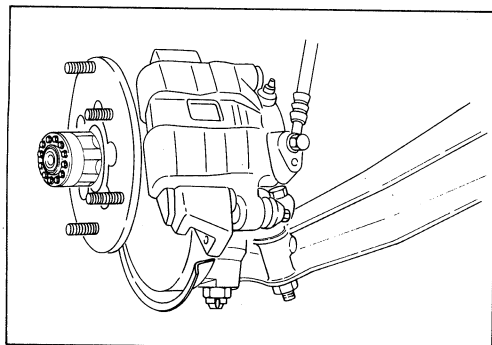
1. Pad assembly with shim

After attaching the pad assembly with shim to the support, position the wear indicator to the lower side of the support.



2. Caliper assembly

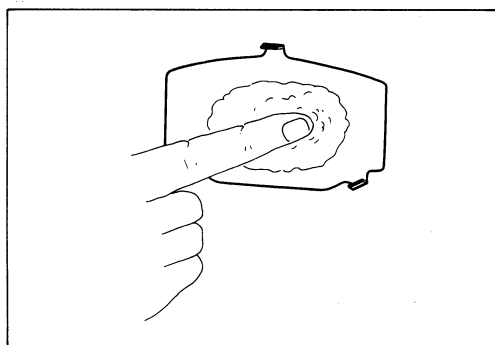
Lower the caliper into its original position.



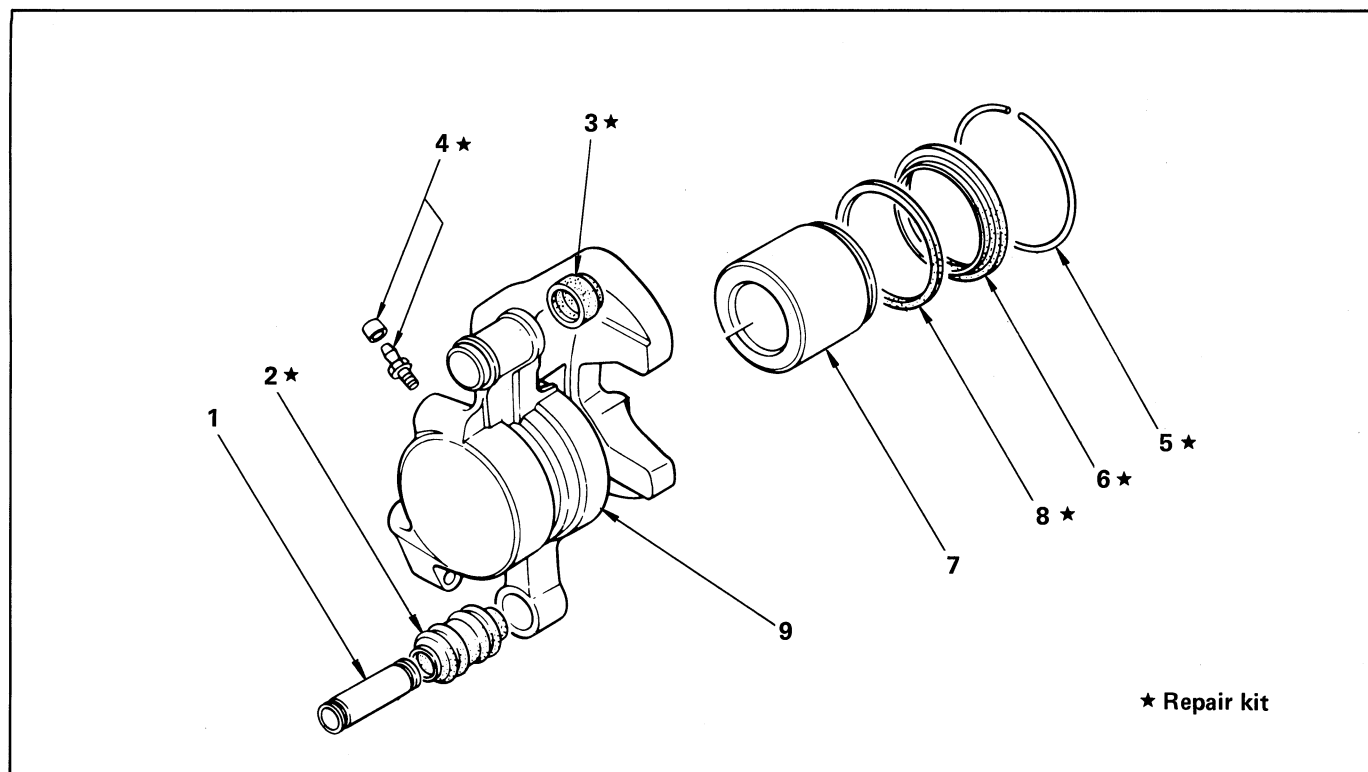
3. Lock bolt

Attach the lock bolt to the caliper.

Torque	kg-m(ft.lbs.)	3.1 — 3.5 (22 — 25)
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**Important operation****1. Pad assembly with shim**

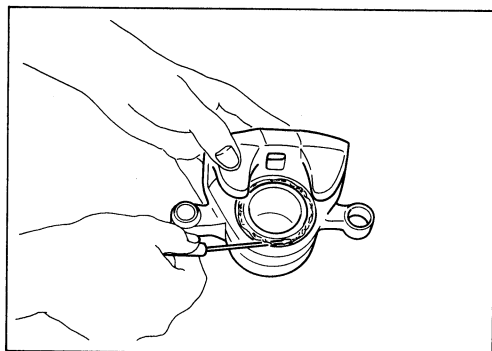
Before attaching the pad assembly with shim to the support, apply special grease to the shim. The special grease is included in the repair kit.

**DISASSEMBLY****CALIPER ASSEMBLY****Disassembly steps**

- | | |
|-------------------------|------------------------|
| 1. Sleeve | ▲ 6. Dust seal: piston |
| 2. Dust boot: sleeve | ▲ 7. Piston |
| 3. Dust boot: guide pin | 8. Ring seal |
| 4. Bleeder with cap | 9. Body: caliper |
| ▲ 5. Dust seal ring | |

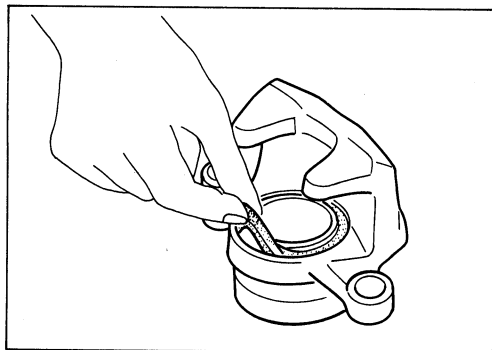


Important operations



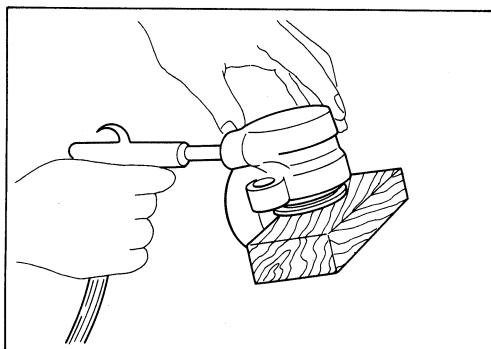
5. Dust seal ring

Use a small screw driver to remove the dust boot.



6. Dust seal: piston

Do not place your fingers in front of the piston in an attempt to catch or protect it when applying compressed air.

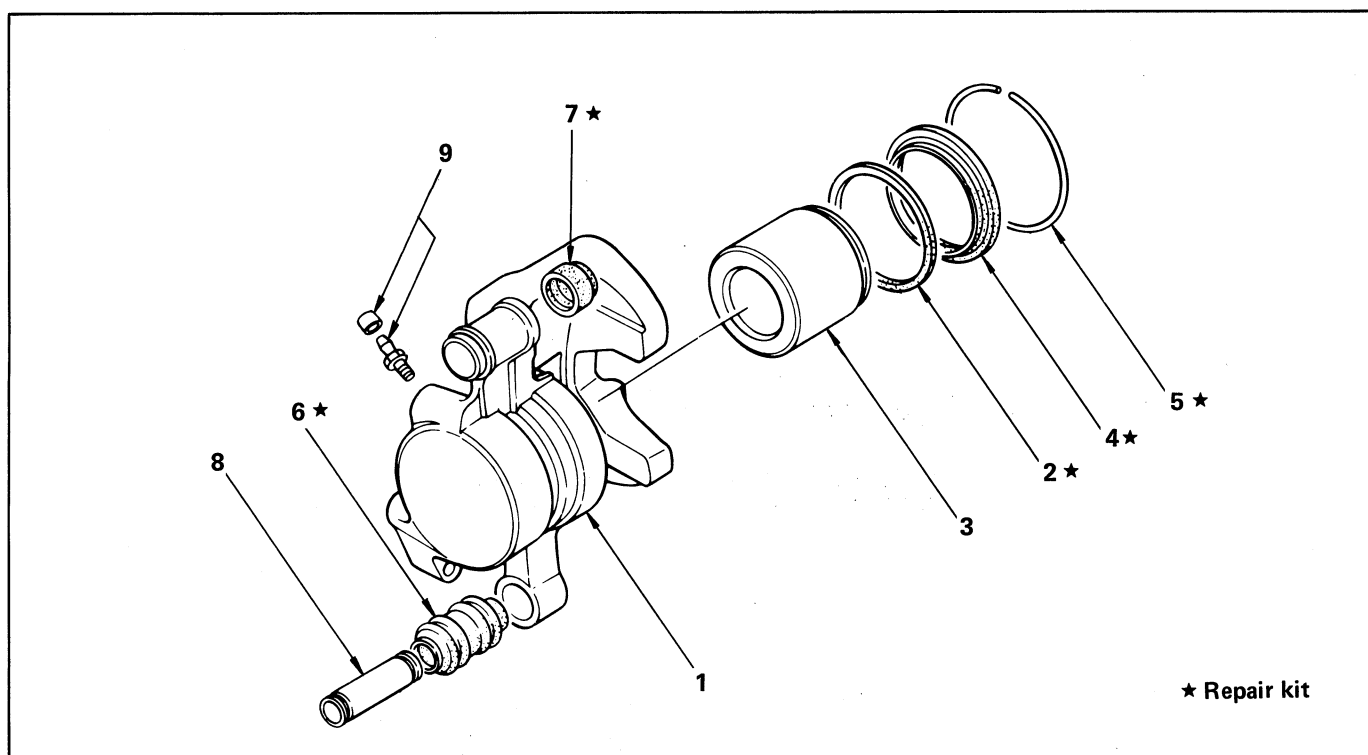


7. Piston with ring seal

Insert a block of wood into the caliper and force out the piston by blowing compressed air into the caliper at the flexible hose attachment.



REASSEMBLY



★ Repair kit

Reassembly steps

- ▲ 1. Body ; caliper
- ▲ 2. Ring seal
- ▲ 3. Piston
- ▲ 4. Dust seal ; piston
- 5. Dust seal ring
- ▲ 6. Dust boot ; sleeve
- ▲ 7. Dust boot ; guide pin
- 8. Sleeve
- ▲ 9. Bleeder with cap

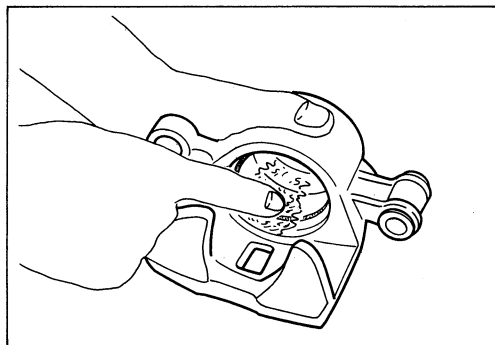


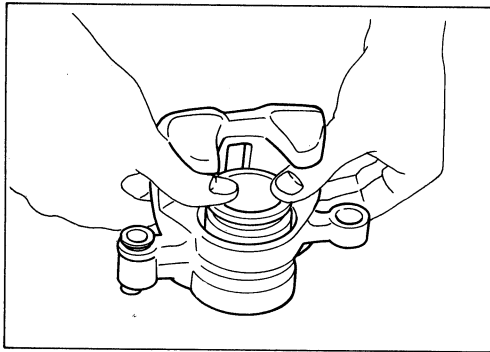
Important operations



- 1. Body ; caliper
- 2. Ring seal

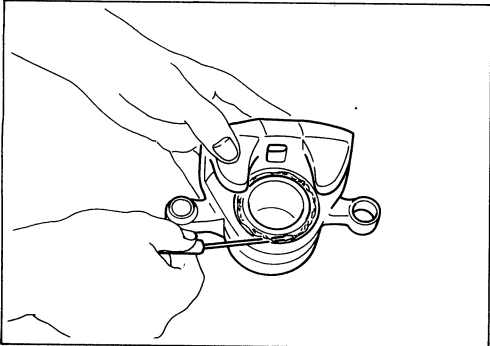
Apply special rubber grease to the ring seal and cylinder wall, the insert the ring seal into the cylinder.
Special rubber grease is included in the repair kit.





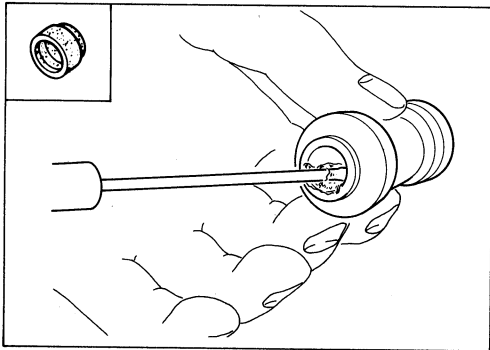
3. Piston

When inserting the piston into the cylinder, use finger pressure only. Do not use a mallet or other impact tool, since damage to the cylinder wall or ring seal can result.



4. Dust seal ; piston

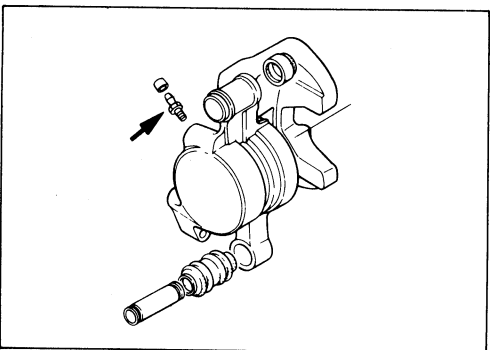
Apply special grease (Approx. 1g) to the piston and attach the dust seal to the piston and caliper. Insert the seal ring into the dust seal.



6. Dust boot ; sleeve

7. Dust boot ; guide pin

Install the sleeve dust boot on the caliper after applying special rubber grease (Approx. 1g) into the sleeve and guide pin boots, then insert the sleeve into the dust boot.



9. Bleeder with cap

Torque	kg-m(ft.lbs.)	0.8 - 1.0 (5.8 - 7.2)
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INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Disc plate
- Caliper body
- Cylinder bore
- Piston
- Support bracket
- Lock bolt
- Guide pin



Visual check

Inspect the following parts for wear, bending, distortion, cracking, corrosion, or other abnormal conditions.



Disc plate

- Thickness

	mm(in.)	
Standard	Minimum thickness after refinishing	Replacement thickness (Discard)
18.0 (0.705)	16.97 (0.668)	16.6 (0.654)



- Run out

Limit	mm(in.)	0.13 (0.005) or less
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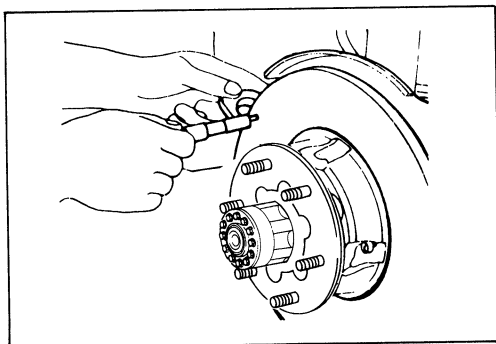
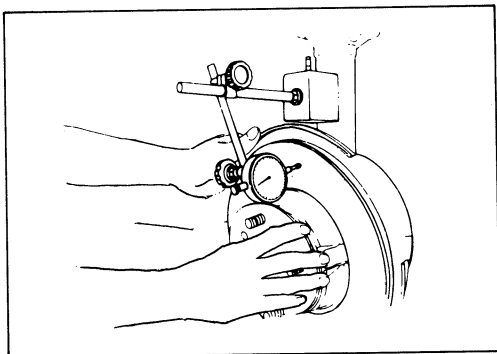
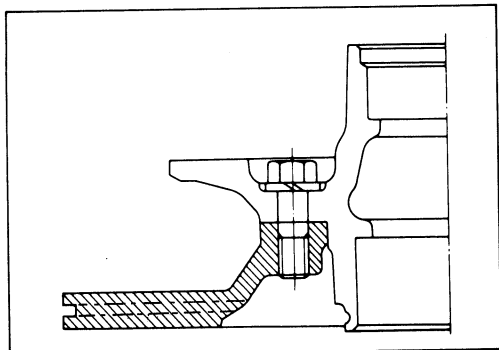
Before inspection, adjust the wheel bearing correctly. Using a dial gauge, measure the run out at the center of disc pad contact surface.

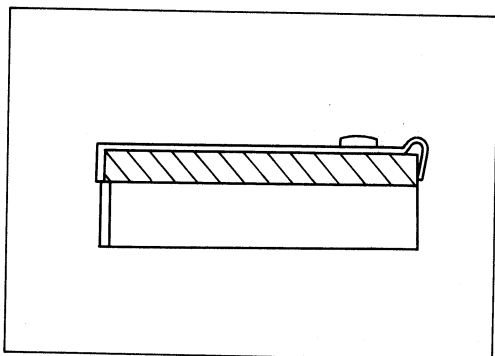


- Parallelism

Limit	mm(in.)	0.03 (0.001) or less
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Contact surface must be within 0.03 at the circumference of the 204 dia. circle.



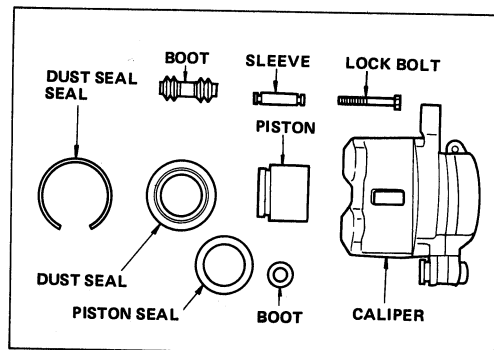
**Thickness of the disc pad**

		mm(in.)
Standard		Limit
10.5		1.0 (0.039)

Replace the front disc pad whenever the pad wear indicator makes a squeaking noise or when the pad is worn to within 1 mm of the backing plate.



All four brake pads should be replaced together.

**Seal and boots**

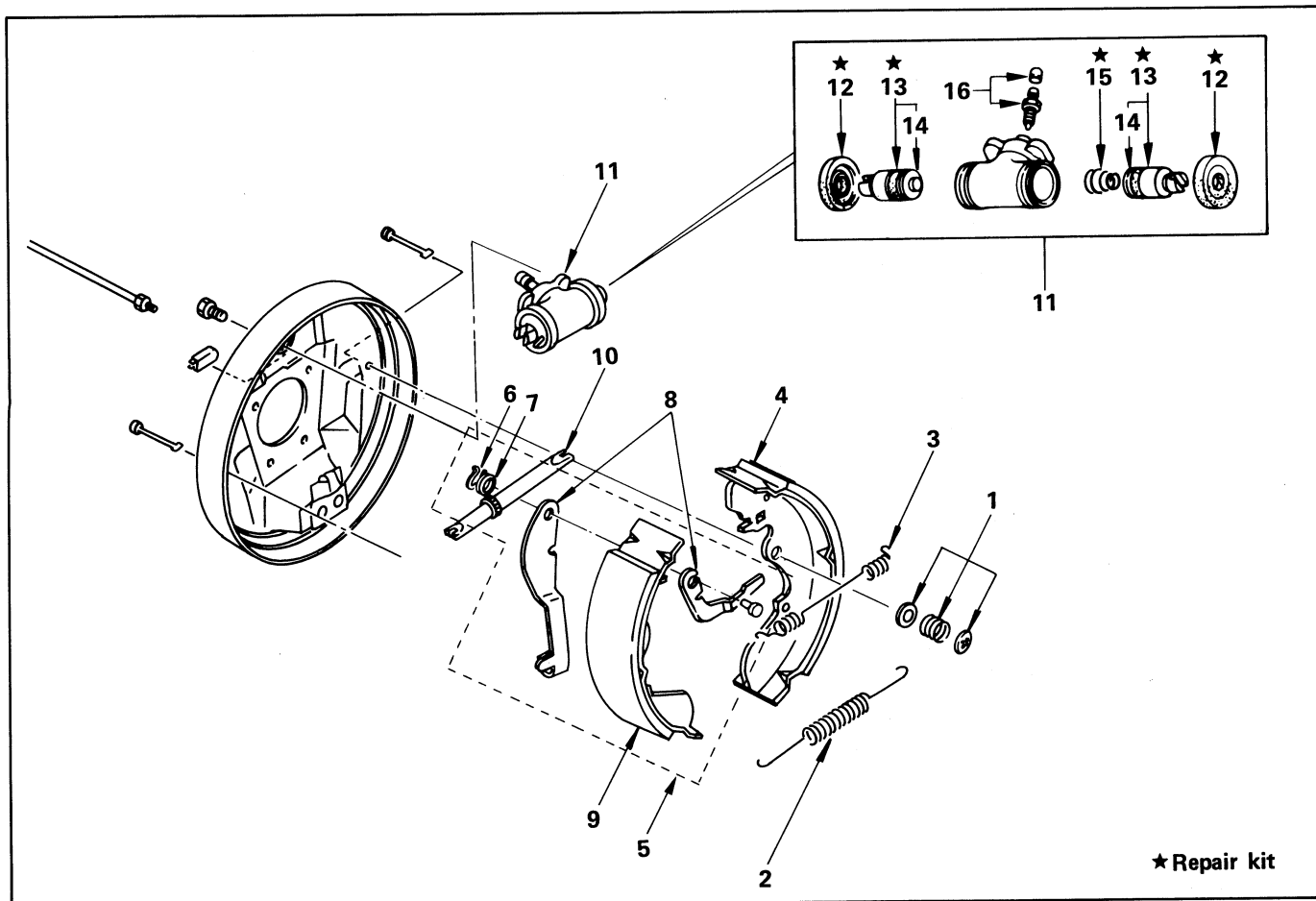
The dust seal, dust boots and piston seal are to be replaced each time the caliper is overhauled.
Discard these rubber parts.

REAR BRAKE ASSEMBLY



DISASSEMBLY

First, disassemble the brake drum. Then, disassemble the rear brake assembly. Refer to the "Rear Axle" section for the brake drum disassembly procedure.



★ Repair kit

MAJOR COMPONENTS

Disassembly steps

- | | |
|-----------------------------|------------------------------|
| 1. Holding spring | 7. Washer ; wave |
| ▲ 2. Return spring ; lower | 8. Lever ; parking brake |
| 3. Return spring ; upper | 9. Shoe assembly (secondary) |
| 4. Shoe assembly (primary) | 10. Adjuster assembly |
| 5. Shoe assembly with lever | 11. Wheel cylinder assembly |
| 6. Retainer | |

MINOR COMPONENTS

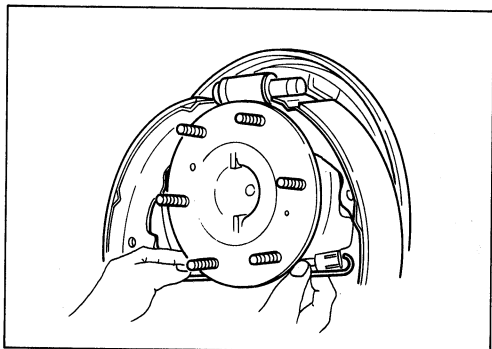
Disassembly steps

- | | |
|-----------------------------|------------------------------|
| 11. Wheel cylinder assembly | 14. Cup ; piston |
| 12. Boot ; wheel cylinder | 15. Return spring ; piston |
| 13. Piston assembly | 16. Bleeder ; wheel cylinder |



Important operations

2. Return spring ; lower



INSPECTION AND REPAIR

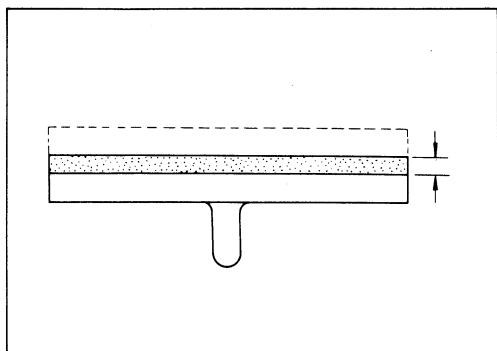
Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Brake drum
- Back plate
- Brake lining
- Wheel cylinder body
- Piston
- Piston cup
- Return spring

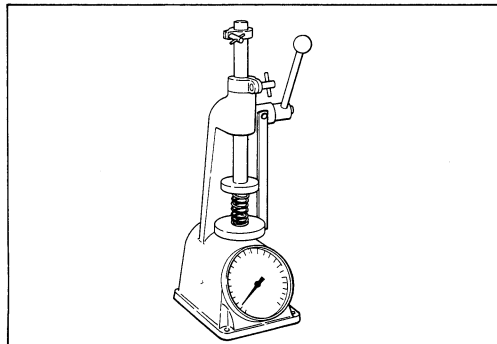


Visual check

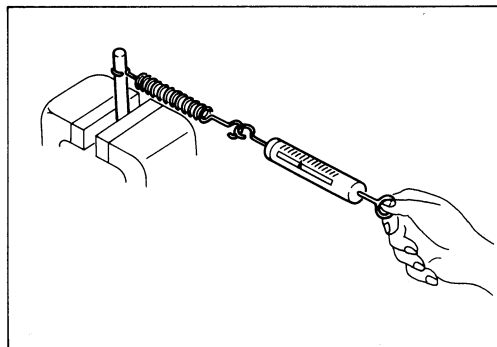
Inspect the following parts for wear scuffs, scratches, corrosion, stains, deterioration, or other abnormal conditions.

**Thickness of the brake lining**

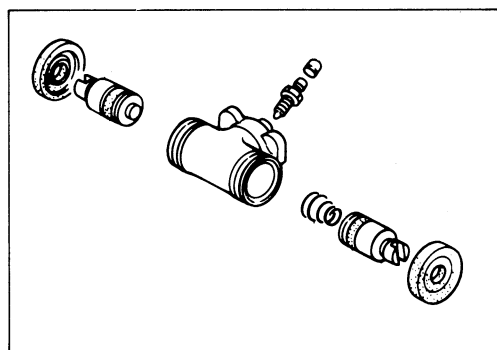
Limit	mm(in.)	1.0 (0.039)
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**Inspection of the return spring**

	Free length mm(in.)	Set length mm(in.)	Set load kg(lbs.)
Holding spring	15.0 (0.591)	11.2 (0.441)	10.1 ± 1.0
Wheel cylinder spring	37.4 (1.472)	8.0 (0.315)	(8.21 ± 0.22)



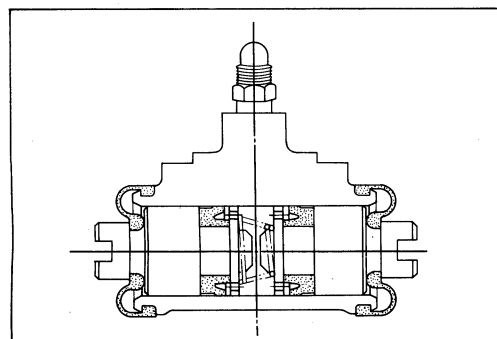
	Free length mm(in.)	Set length mm(in.)	Set load kg(lbs.)
Shoe return spring: upper	122.9 (4.839)	134.9 (5.311)	11 ± 1.1 (24.3 ± 2.4)
Shoe return spring: lower	167.2 (6.583)	190.2 (7.488)	28.0 ± 2.8 (61.7 ± 6.4)

**Clean wheel cylinder parts**

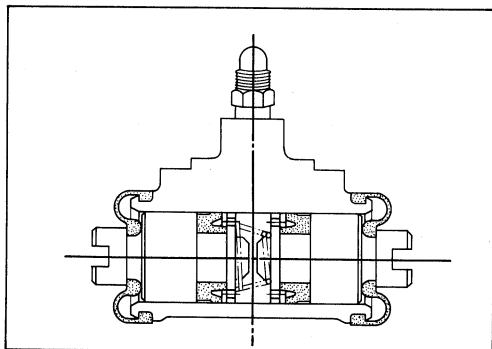
Always use clean brake fluid to clean wheel cylinder parts.



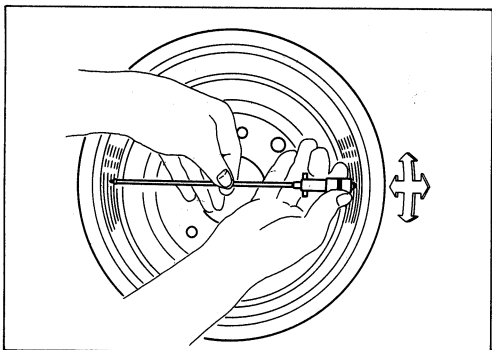
Do not use mineral-base cleaning solvents such as gasoline, kerosene, acetone, paint thinner, or carbon tetrachloride.

**Clearance between the wheel cylinder and the piston**

Limit	mm(in.)	0.15 (0.006)
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**Piston cups**

Inspect the piston cups for wear, distortion, fatigue, or other abnormal conditions.

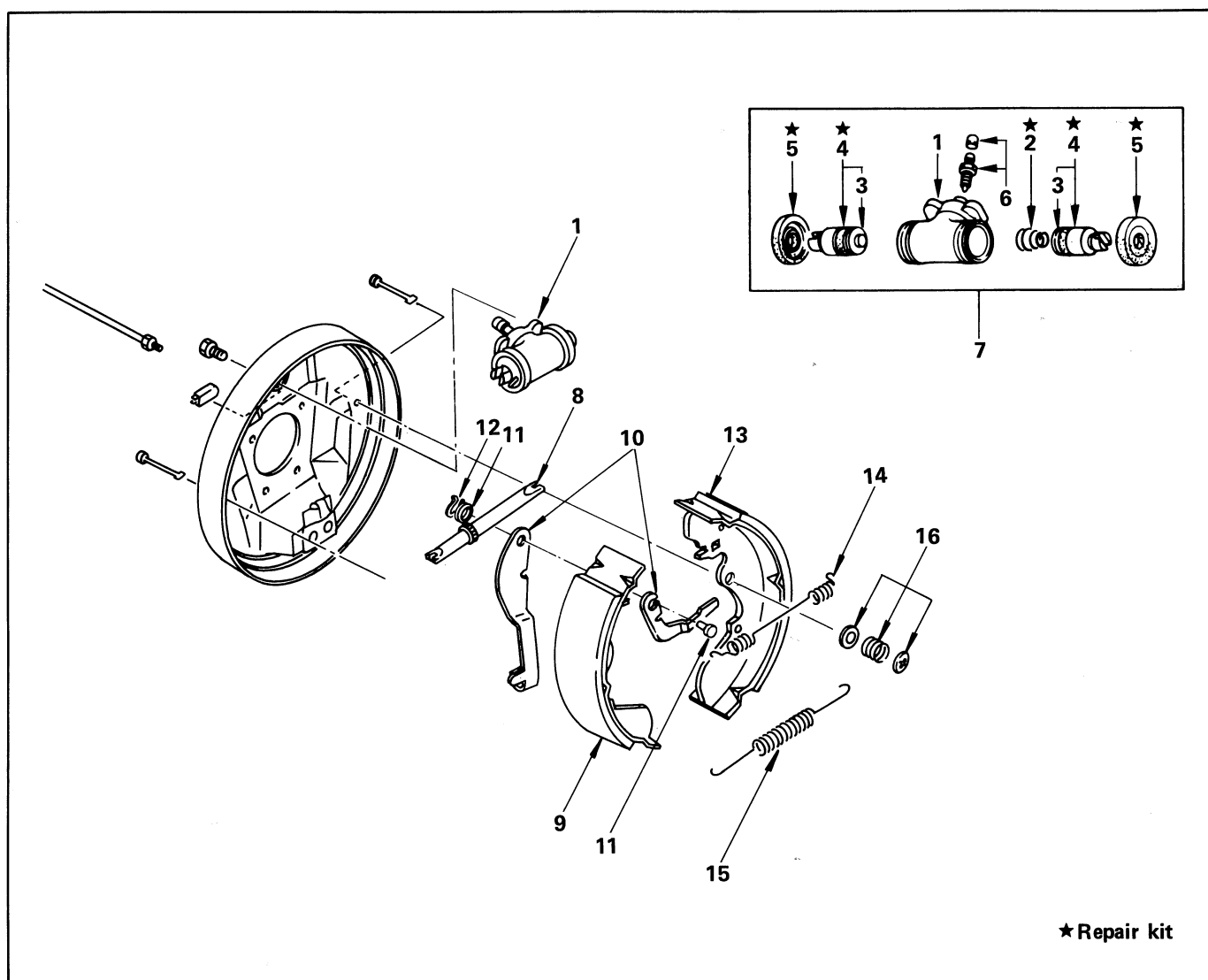
**Measuring the brake drum**

mm(in.)

	Standard	Limit
Inside diameter	254 (10.000)	255.5 (10.059)
Run-out	0.15 (0.006)	



REASSEMBLY



MINOR COMPONENTS

Reassembly steps

Wheel cylinder assembly

- | | |
|----------------------------|-------------------------------|
| ▲ 1. Body ; wheel cylinder | ▲ 4. Piston assembly |
| 2. Return spring ; piston | 5. Boot ; wheel cylinder |
| 3. Cup ; piston | ▲ 6. Bleeder ; wheel cylinder |

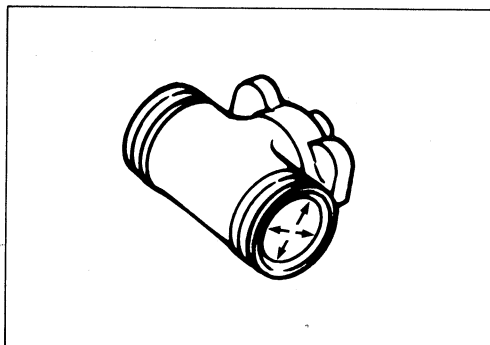
MAJOR COMPONENTS

Reassembly steps

- | | |
|------------------------------|------------------------------|
| ▲ 7. Wheel cylinder assembly | 12. Retainer |
| 8. Adjuster assembly | 13. Shoe assembly with lever |
| 9. Shoe assembly (secondary) | 14. Return spring ; upper |
| 10. Lever ; auto adjuster | 15. Return spring ; lower |
| 11. Washer ; wave | 16. Holding spring |

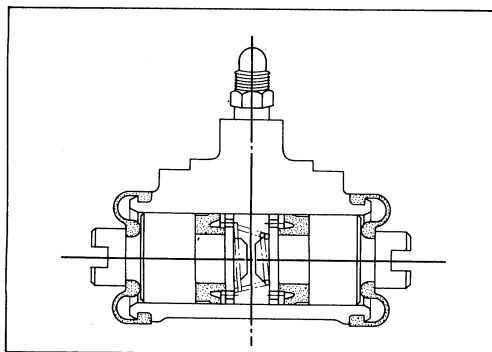


Important operations



1. Body ; wheel cylinder

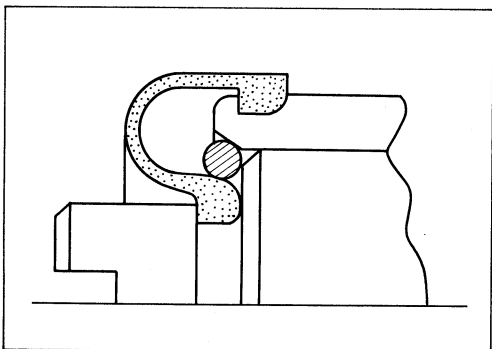
Lubricate the cylinder bore with clean rubber grease.



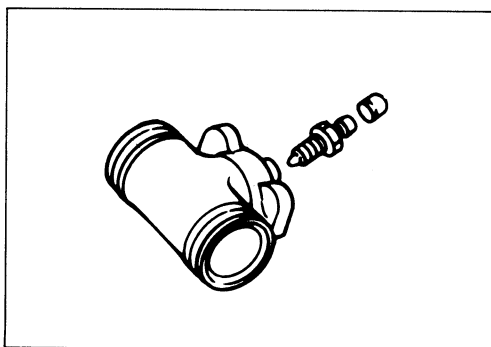
4. Piston assembly

Install new piston cups on each piston so that the flared ends of the cups are turned to the inboard side of the piston.

Attach the return spring and the boot to the piston.

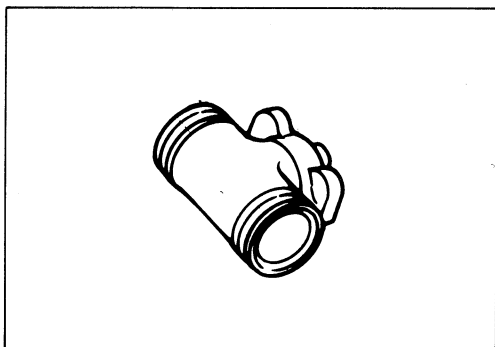


Apply DELCO silicon lube No. 5459912 (or equivalent) to the piston and inner face of the boots.

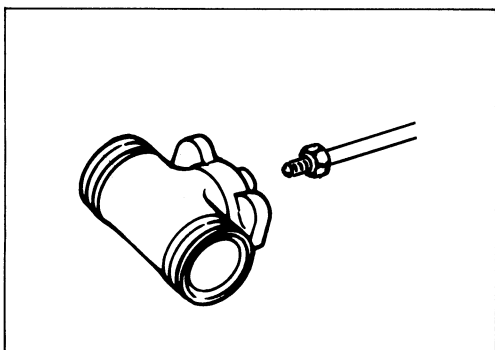


6. Bleeder ; wheel cylinder

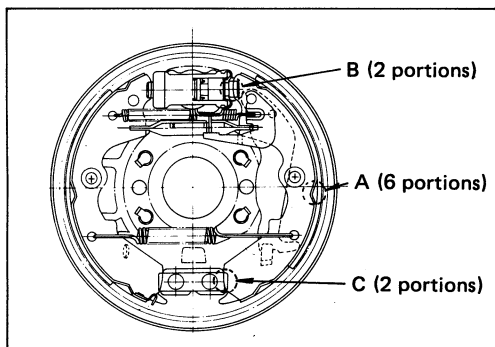
Torque	kg-m(ft.lbs.)	0.8 — 1.0 (5.8 — 7.2)
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**7. Wheel cylinder assembly**

Torque	kg-m(ft.lbs.)	0.8 — 1.2 (5.8 — 8.7)
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**Brake pipe**

Torque	kg-m(ft.lbs.)	1.4 — 1.8 (10 — 13)
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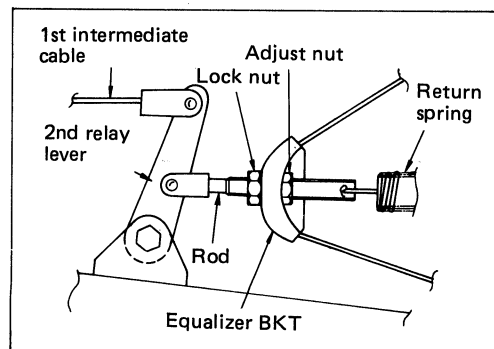


Apply grease lightly to back plate A , Piston B and brake shoe C .



ADJUSTMENT PROCEDURE OF SERVICE BRAKE

All brakes are self-adjusting. The front brakes self-adjust when the vehicle is moved slowly back and forth while applying the service brakes. The rear brakes self-adjust when the parking brake is set and released.



Take the following steps after overhauling the rear brake assembly.

1. Move the parking brake handle to its fully released position.
2. Firmly grasp the second relay lever rod. Rotate the adjust nut until all slack disappears from the cable. Set the adjust nut.
3. Applying about thirty kilograms (30 kg/66.15 lbs.) of force, pull the parking brake handle to its fully set position three or four times.
4. If the parking brake is properly adjusted, the traveling range between the fully disengaged position and the fully engaged position will be between twelve (12) and fourteen (14) notches.

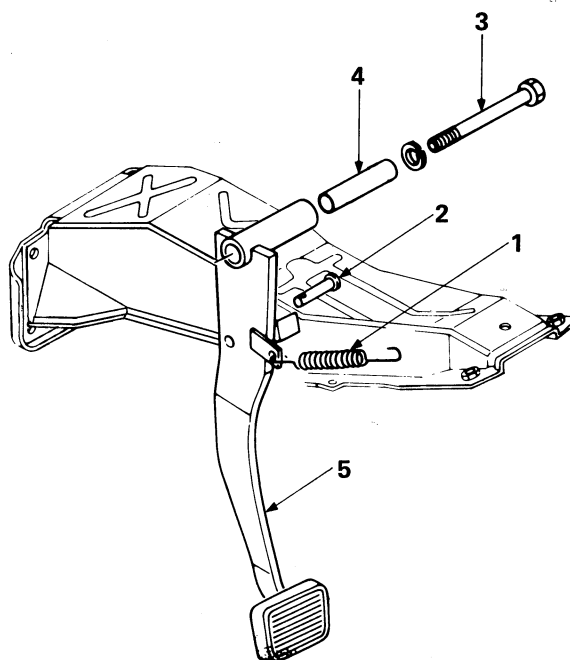
If the traveling range is not within these limits, again reset the adjust nut.

BRAKE CONTROL



REMOVAL AND INSTALLATION

BRAKE PEDAL ASSEMBLY



Removal steps

1. Return spring
2. Pin ; push rod to pedal
3. Pin ; fulcrum, pedal to bracket
4. Sleeve ; bracket pedal
5. Pedal assembly

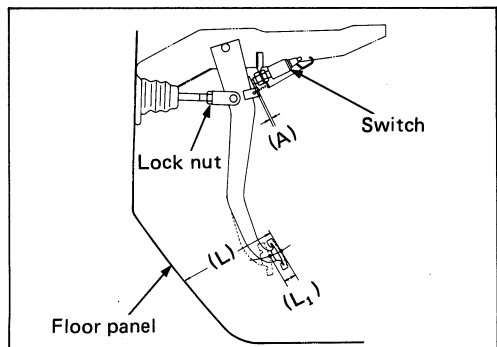
Installation steps

To install, follow the removal procedure in reverse order.



ADJUSTMENT PROCEDURE OF BRAKE PEDAL

The push-rod serves as the brake pedal stopper when the pedal is fully released. Brake pedal height adjustment should be performed as follows.



1. Brake pedal - Height

Measure the brake pedal height after making sure the pedal is fully returned by the pedal return spring.

	mm(in.)
Pedal height (L)	198 — 208 (7.8 — 8.2)
Free play (L1)	7 — 10 (0.28 — 0.39)

If the measured value deviates from the above range, adjust the brake pedal as follows.

- a) Disconnect the stop lamp switch.
- b) Loosen the lock nut on the push rod.
- c) Adjust the brake pedal to the specified height, rotating the push rod in the appropriate direction.



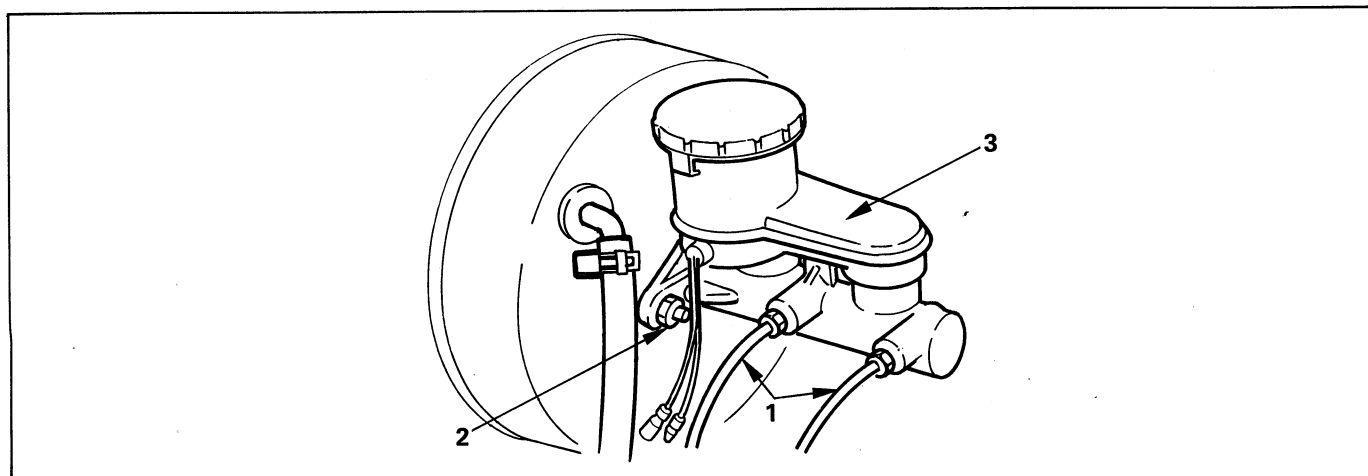
Nut torque	kg-m(ft.lbs.)	1.8 — 2.2 (13 — 16)
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- d) Install the stop lamp switch.

Clearance

Between the switch housing and brake pedal (A)	mm(in.)	0.5 — 1.0 (0.02 — 0.04)
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MASTER CYLINDER ASSEMBLY



Removal steps

- ▲ 1. Brake pipe
- ▲ 2. Bolt ; master cylinder to vacuum servo
- ▲ 3. Master cylinder assembly

Installation steps

- ▲ 3. Master cylinder assembly
- ▲ 2. Nut ; master cylinder to vacuum servo
- ▲ 1. Brake pipe



Important operation — Removal

1. Brake pipe

Take care to avoid brake fluid spillage on painted surfaces as damage to the surfaces will result.

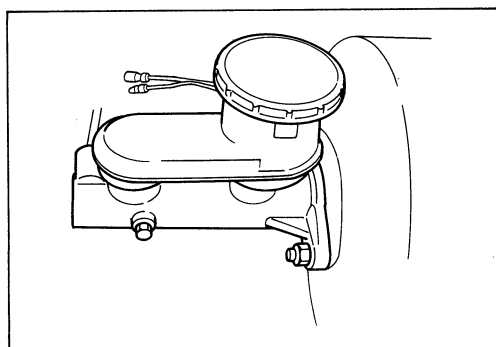


Important operations — Installation

2. Nut ; master cylinder to vacuum servo

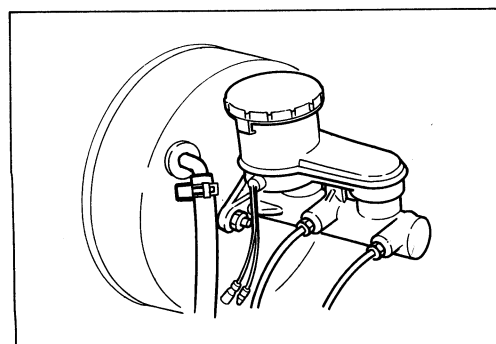


Torque	kg-m(ft.lbs.)	1.1 — 1.5 (8 — 11)
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1. Brake pipe

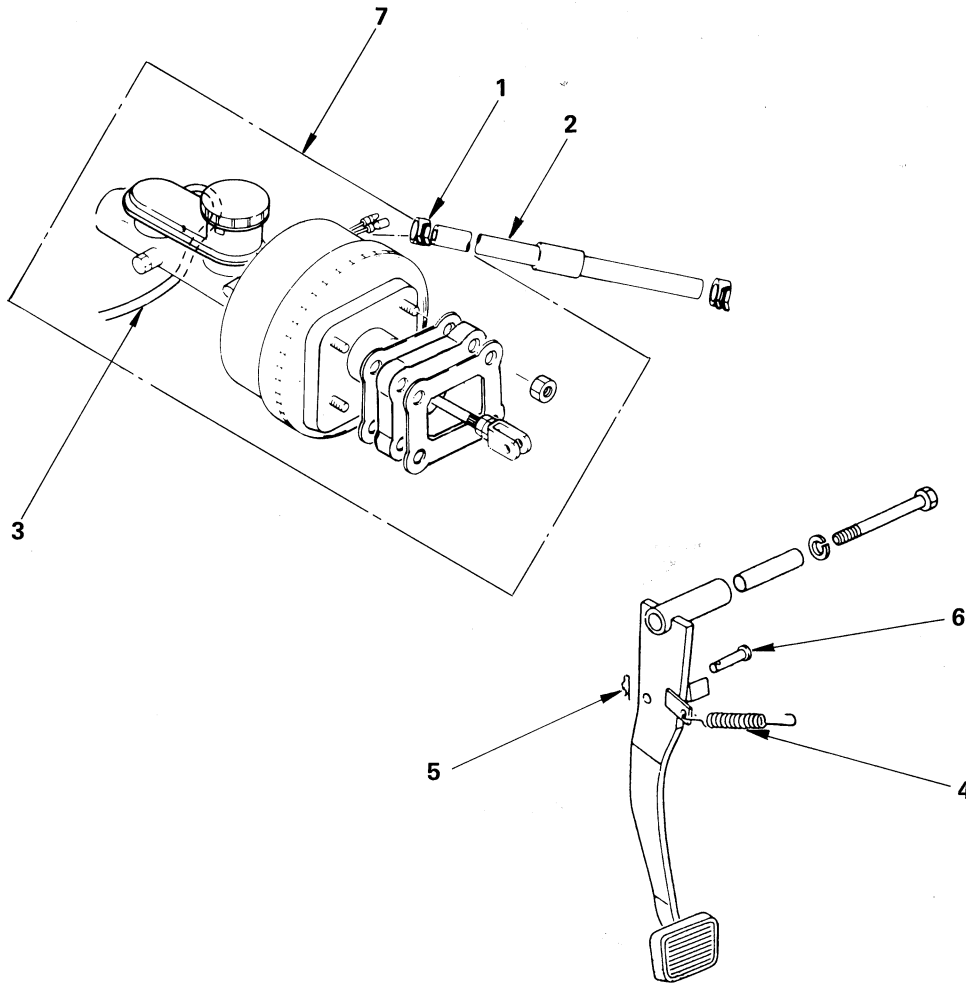
Torque	kg-m(ft.lbs.)	0.9 — 1.5 (6.5 — 11)
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MASTER VAC



REMOVAL AND INSTALLATION



Removal steps

1. Clamp ; vacuum hose
2. Vacuum hose
- ▲ 3. Brake pipe
4. Return spring ; brake pedal
5. Snap ring
6. Pin ; push rod to brake pedal
7. Master vac with master cylinder and plate
8. Master cylinder assembly
9. Master vac assembly

Installation steps

9. Master vac assembly
- ▲ 8. Master cylinder assembly
- ▲ 7. Master vac with master cylinder and plate
6. Pin ; push rod to brake pedal
5. Snap ring
4. Return spring ; brake pedal
- ▲ 3. Brake pipe
- ▲ 2. Vacuum hose
1. Clamp ; vacuum hose



Important operation — Removal

3. Brake pipe

When handling, be careful not to spill brake fluid over the painted surfaces as damage to the paint finish will result.



Important operations — Installation



8. Master cylinder assembly

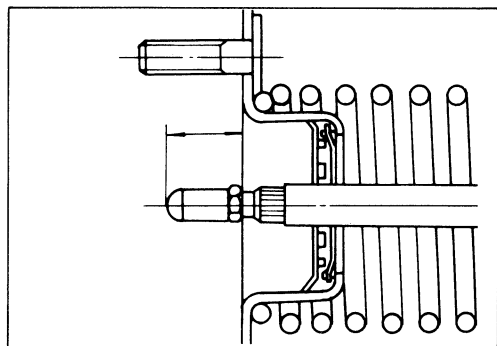
Check the distance from the flange face of the master-vac to the end of the push-rod before installation of the master cylinder.



Projection	mm(in.)	18.0 — 18.2 (0.709 — 0.717)
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If the measured distance deviates from the specified range, make an adjustment with the lock nut at the end of the push-rod.
Push rod gauge ; J-29759

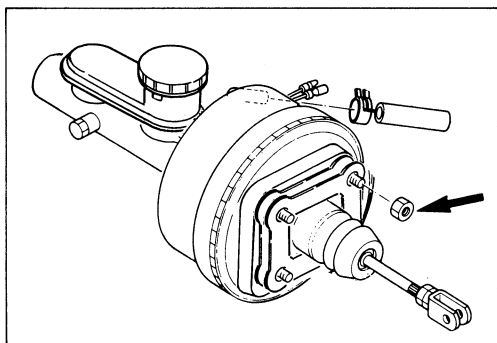
Torque	kg-m(ft.lbs.)	1.8 — 2.2 (13 — 16)
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7. Master-vac with master cylinder

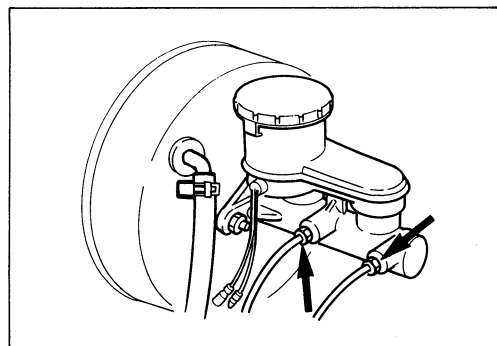
Torque	kg-m(ft.lbs.)	2.5 — 2.9 (18 — 21)
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Apply sealer to the dashboard fitting face.



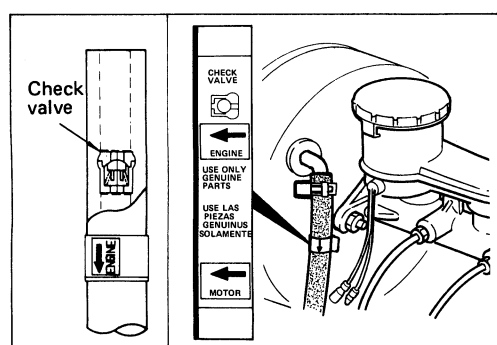
3. Brake pipe

Torque	kg-m(ft.lbs.)	1.4 — 1.8 (10 — 13)
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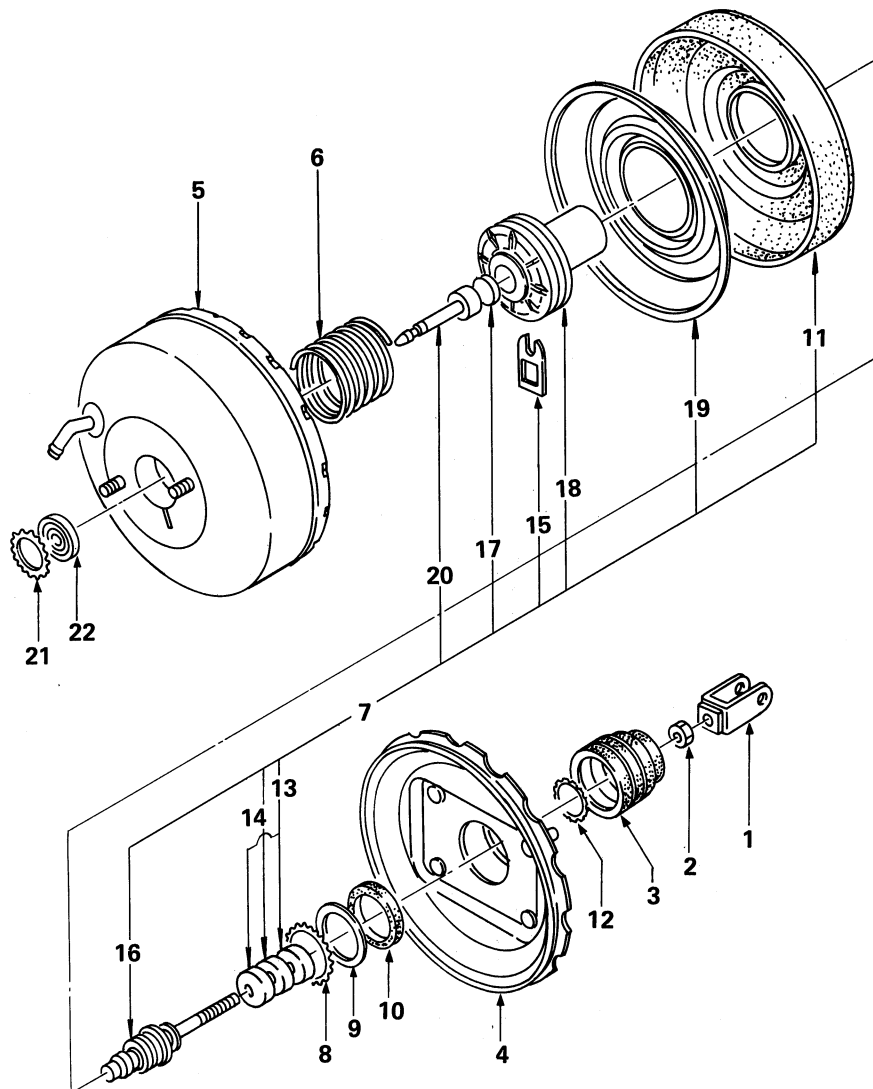
2. Vacuum hose

- When removing or replacing the vacuum hose, make sure that the arrow on the label of the hose is facing the engine.
- Also confirm that the check valve is facing the engine.

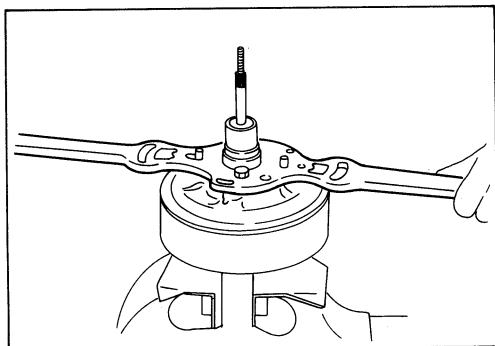




DISASSEMBLY

**Disassembly steps**

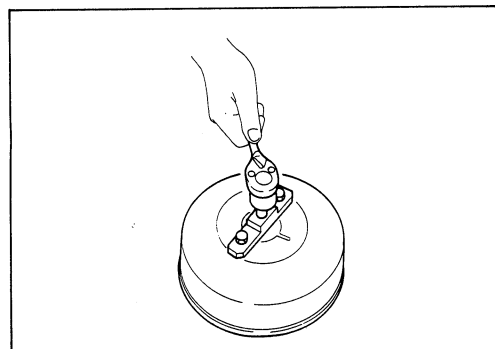
- | | |
|-------------------------------------|--------------------------------|
| 1. Clevis ; yoke | 12. Retainer ; master vac |
| 2. Nut ; clevis to master vac | 13. Filter ; master vac |
| 3. Guard ; valve body | 14. Silencer ; master vac |
| ▲ 4. Shell assembly ; rear | 15. Key ; stopper, valve rod |
| ▲ 5. Shell assembly ; front | 16. Rod assembly ; valve |
| 6. Spring ; master vac | 17. Disc ; reaction |
| 7. Plate ; diaphragm assembly | 18. Valve body |
| 8. Retainer ; master vac | 19. Plate ; diaphragm |
| 9. Bearing ; master vac | 20. Rod assembly ; push |
| 10. Seal ; valve body | 21. Retainer ; master vac |
| 11. Diaphragm assembly ; master vac | 22. Seal assembly ; master vac |

**Important operation****4. Shell assembly ; rear**

- Apply a setting mark across the joint before disassembly.
- Note that the diaphragm spring pops out of position as the rear shell is removed.

Handle : J-9504-01

Fixing tool : J-22805-01

**5. Shell assembly ; front**

Diaphragm remover : J-34350



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Rotor
- Push rod
- Check valve
- Diaphragm plate
- Shell
- Poppet valve

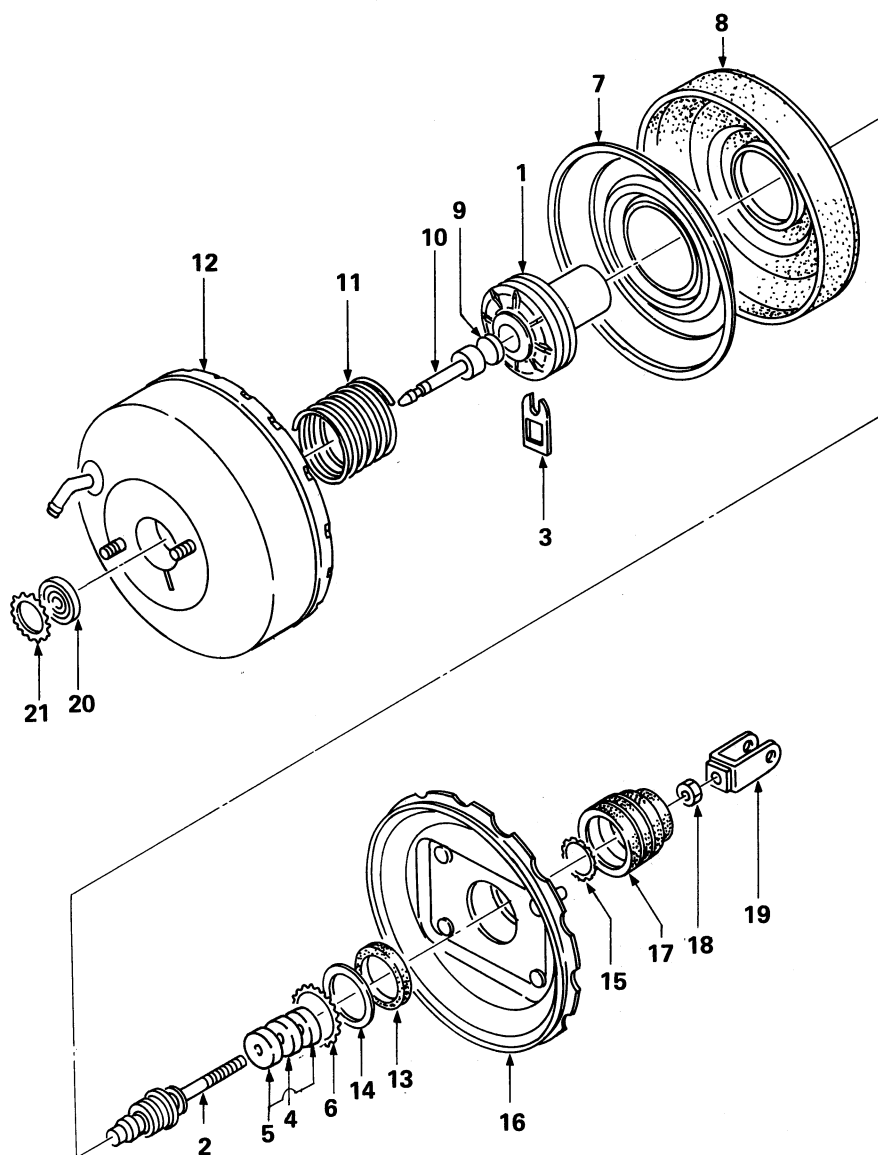


Visual check

Check the following parts for wear, distortion, nicks, cracks, deformation, or other abnormal conditions.



REASSEMBLY



Reassembly steps

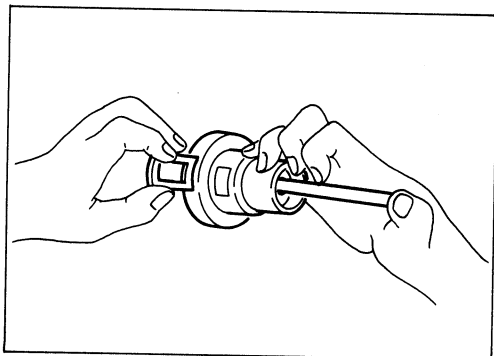
- | | |
|--------------------------------------|----------------------------------|
| 1. Valve body | ▲ 12. Shell assembly ; front |
| 2. Rod assembly ; valve | ▲ 13. Seal ; valve body |
| ▲ 3. Key ; stopper, valve rod | 14. Bearing ; master vac |
| 4. Silencer ; master vac | ▲ 15. Retainer ; master vac |
| 5. Filter ; master vac | ▲ 16. Shell assembly ; rear |
| 6. Retainer ; master vac | 17. Guard ; valve body |
| 7. Plate ; diaphragm | 18. Nut ; clevis to master vac |
| ▲ 8. Diaphragm assembly ; master vac | 19. Clevis ; master vac |
| ▲ 9. Disc ; reaction | ▲ 20. Seal assembly ; master vac |
| 10. Rod assembly ; push | 21. Retainer ; master vac |
| 11. Spring ; master vac | |



Important operations

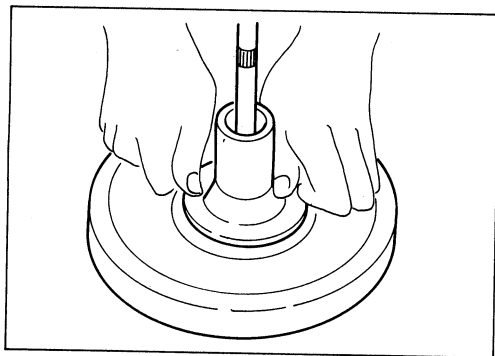


Apply silicone grease to the sliding faces of the parts before reassembly.



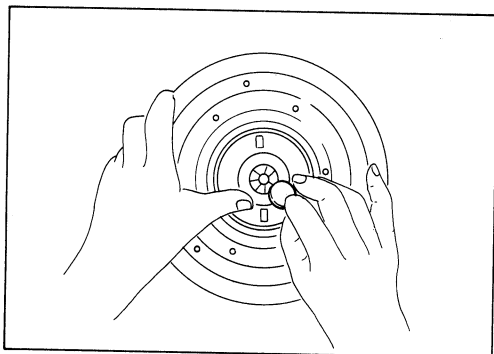
3. Key ; stopper, valve rod

Push in the rod assembly and install the stopper key.



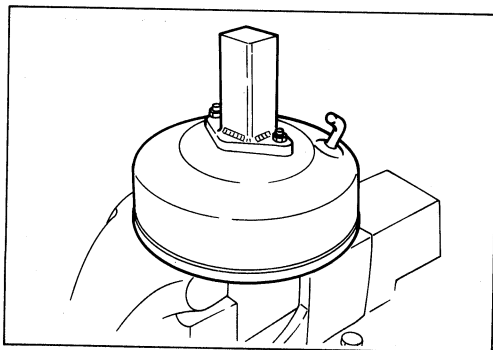
8. Diaphragm assembly ; master vac

Install the diaphragm to the plate taking care not to scratch the diaphragm.



9. Disc ; reaction

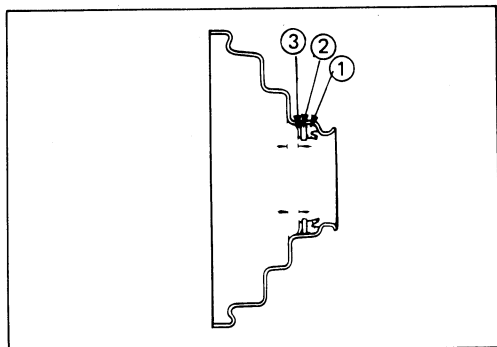
Apply silicone grease to the reaction disc before installation.



12. Shell assembly ; front

Set the fixing tool to the front shell.

Fixing tool : J-22805-01

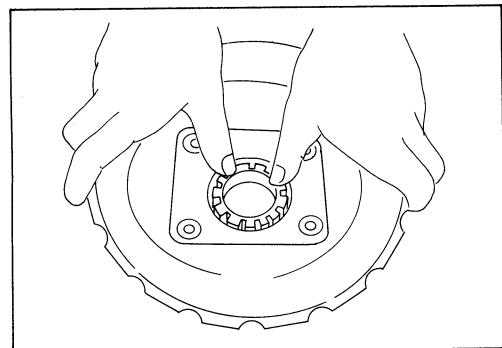
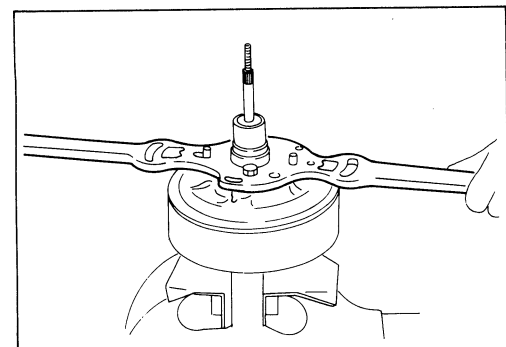
**13. Seal ; value body**

Apply generous amounts of silicone grease to the portions of the rear shell (1) in contact with the seal and shell, then install and secure the plate (2) in position with the retainer (3).



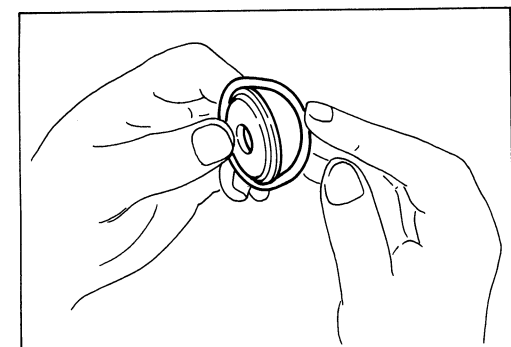
Retainer setting position (From outer edge of rear shell)	mm(in.)	12.9 — 13.2 (0.508 — 0.520)
--	---------	--------------------------------

The setting position of the retainer should not be too deep or too shallow, or air leakage and premature wear of the lipped portion will result.

**15. Retainer ; master vac****16. Shell assembly ; rear**

Apply a thin coat of silicone grease to the front and rear shell fitting face of the diaphragm. Insert the diaphragm spring into the front shell and align marks applied at disassembly. Turn the rear shell in a clockwise direction until it stops in contact with the stopper on the front shell.

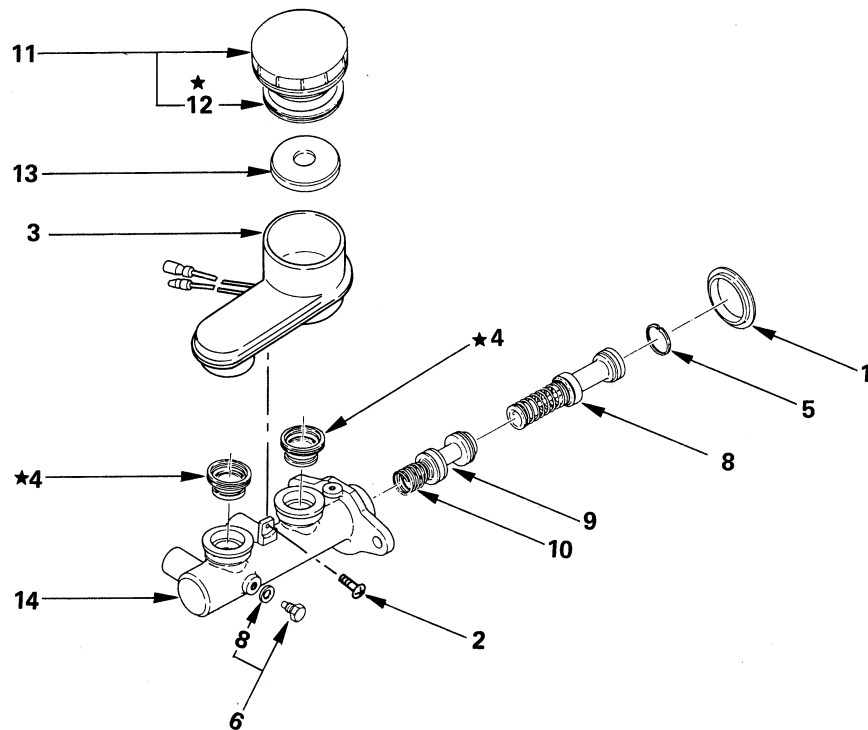
Handle : J-9504-01

**20. Seal assembly ; master vac**

Apply silicone grease to the sliding faces of the seal and push-rod.



DISASSEMBLY



★ : Repair kit

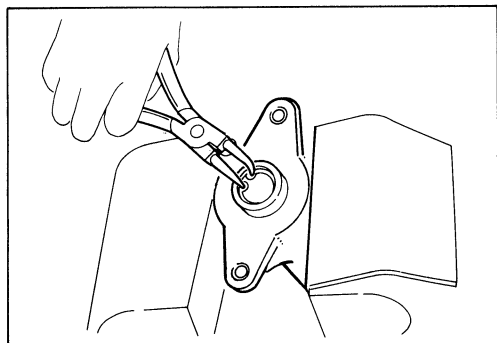
Disassembly steps

- | | |
|-----------------------------|---|
| 1. Dust seal | 8. Piston assembly ; primary and spring |
| 2. Screw | 9. Piston assembly ; secondary |
| 3. Reservoir ; fluid, brake | 10. Spring ; secondary, piston |
| 4. Grommet | 11. Cover ; fluid reservoir |
| ▲ 5. Ring ; snap | 12. Seal |
| ▲ 6. Bolt ; stopper | 13. Float magnet |
| 7. Gasket | 14. Cylinder assembly ; brake, master |

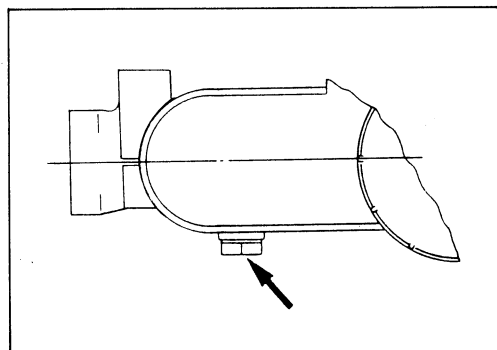


Important operations

When disassembling, inspecting or reassembling the master cylinder assembly, take care not to bring the parts into contact with mineral oil or dust. Wash the piston cups only with brake fluid. Do not use gasoline.



5. Ring ; snap



6. Bolt ; stopper

Push in the primary and secondary pistons and remove the stopper bolt completely from the cylinder body, then remove the primary and secondary piston assemblies.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Cylinder inside face
- Piston
- Piston cap
- Piston cup spacer
- Return port
- Return spring



Visual check

Inspect the following parts for wear, distortion, cuts, nicks, corrosion, or other abnormal conditions.



Clearance between the master cylinder and the piston.

mm(in.)

Standard	Limit
0.04 — 0.125 (0.00158 — 0.00493)	0.15 (0.00591)



Master cylinder bore diameter

Standard	mm(in.)	22.2 (0.874)
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Return port

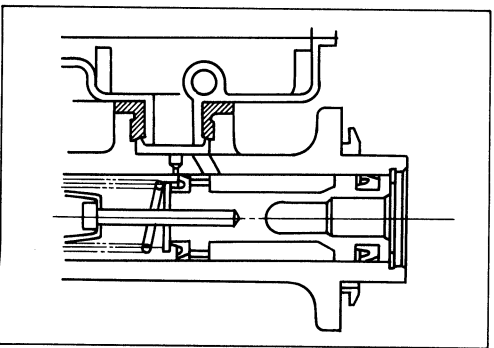
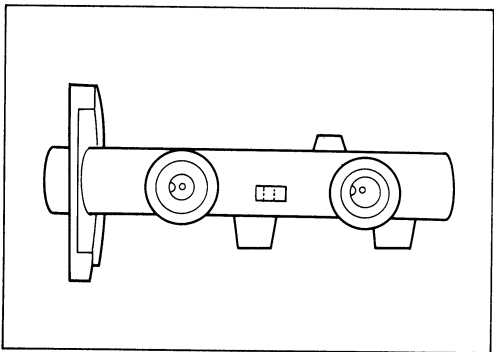
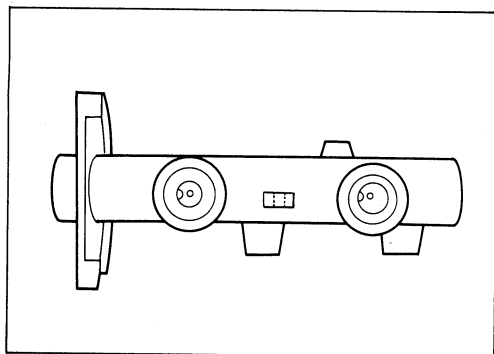
Check the return port for obstructions and if necessary, clean with a tag wire. Blow away foreign matter with compressed air.



Primary piston

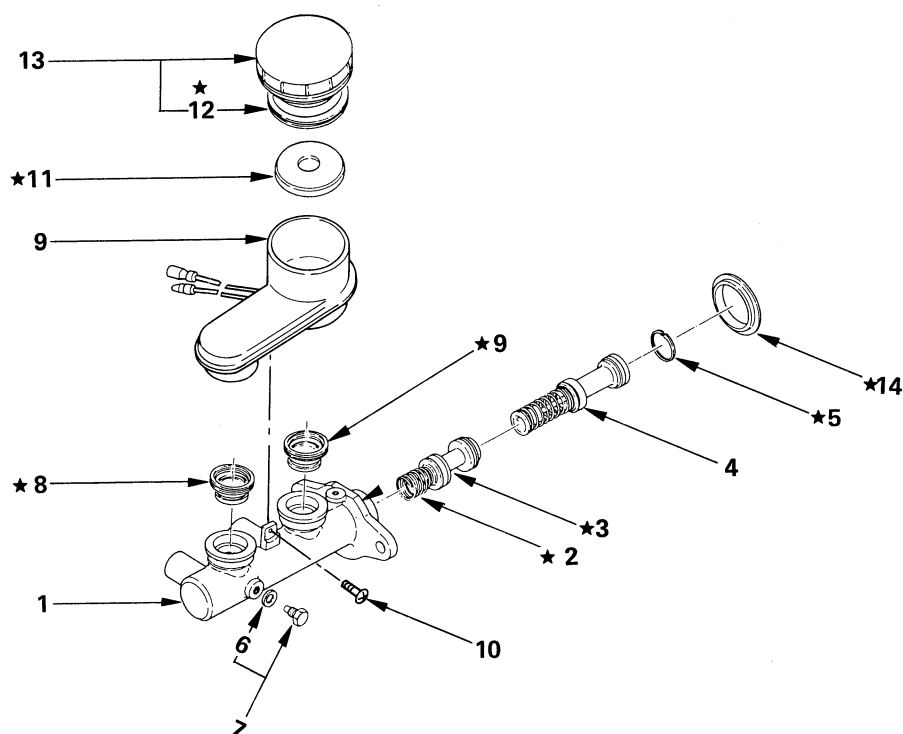
After reassembly, push in the primary piston to see that it returns smoothly.

Repeat the test two or three times to see that brake fluid is forced out from the front and rear outlets.





REASSEMBLY



★ : Repair kit

Reassembly steps

- | | |
|---|-----------------------------|
| ▲ 1. Cylinder assembly ; brake master | ▲ 8. Grommet |
| ▲ 2. Spring ; secondary, piston | 9. Reservoir ; fluid, brake |
| ▲ 3. Piston assembly ; secondary | ▲ 10. Screw |
| ▲ 4. Piston assembly ; primary and spring | 11. Float magnet |
| 5. Ring ; snap | 12. Seal |
| 6. Gasket | 13. Cover ; fluid reservoir |
| ▲ 7. Bolt ; stopper | ▲ 14. Dust seal |



Important operations



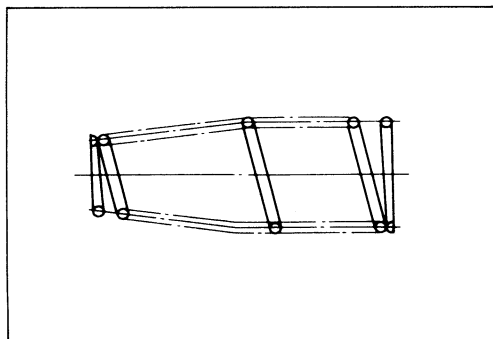
1. Body ; master cylinder

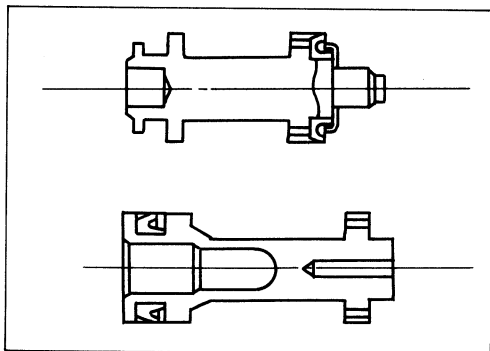
Lubricate the master cylinder bore with clean rubber grease.



2. Spring ; secondary, piston

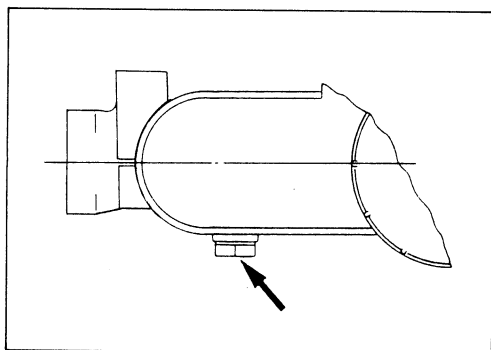
First sub-assemble the spring to the secondary piston, then insert to the cylinder.



**3. Piston assembly ; secondary****4. Piston assembly ; primary**

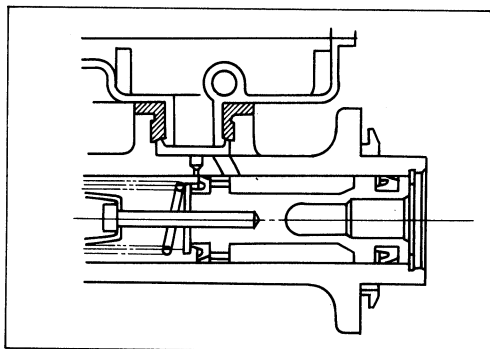
Lubricate the piston cups on the secondary and primary piston assemblies with clean brake fluid.

Take care not to scratch the piston cup when installing the piston assemblies.

**7. Bolt ; stopper**

Depress the primary piston and install the piston stopper bolt with a new gasket.

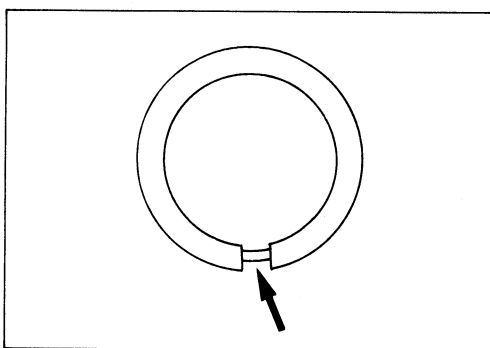
Torque	kg-m(ft.lbs.)	1.6 — 2.0 (12 — 14)
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**8. Grommet**

Lubricate the new grommets with clean rubber grease. Insert the grommets, with the flared side ahead, into the cylinder body.

**10. Screw**

Torque	kg-m(ft.lbs.)	0.10 — 0.20 (0.7 — 1.5)
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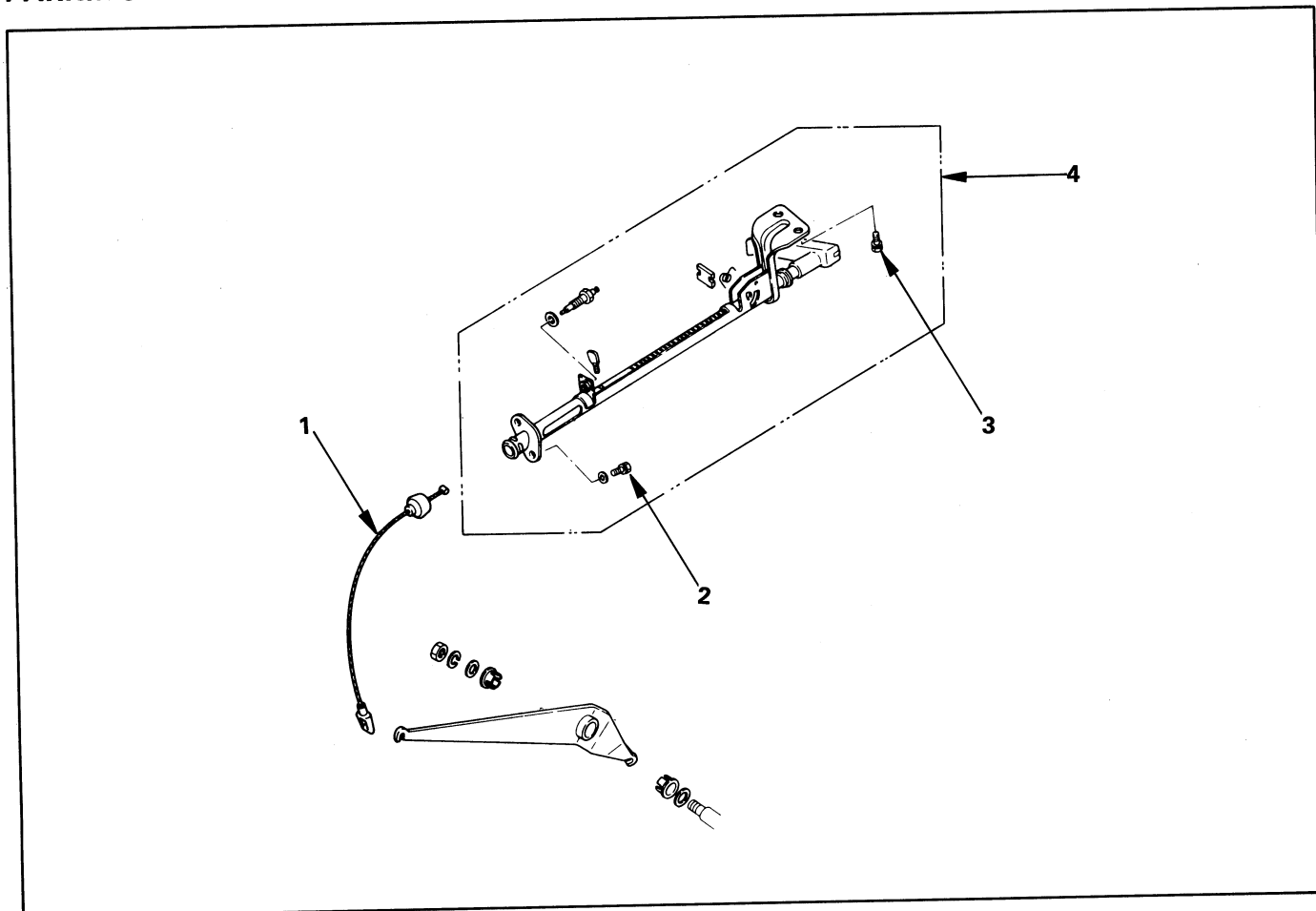
**14. Dust seal**

Install the dust seal so that its groove turns downward.

PARKING BRAKE

REMOVAL AND INSTALLATION

PARKING BRAKE STEM ASSEMBLY



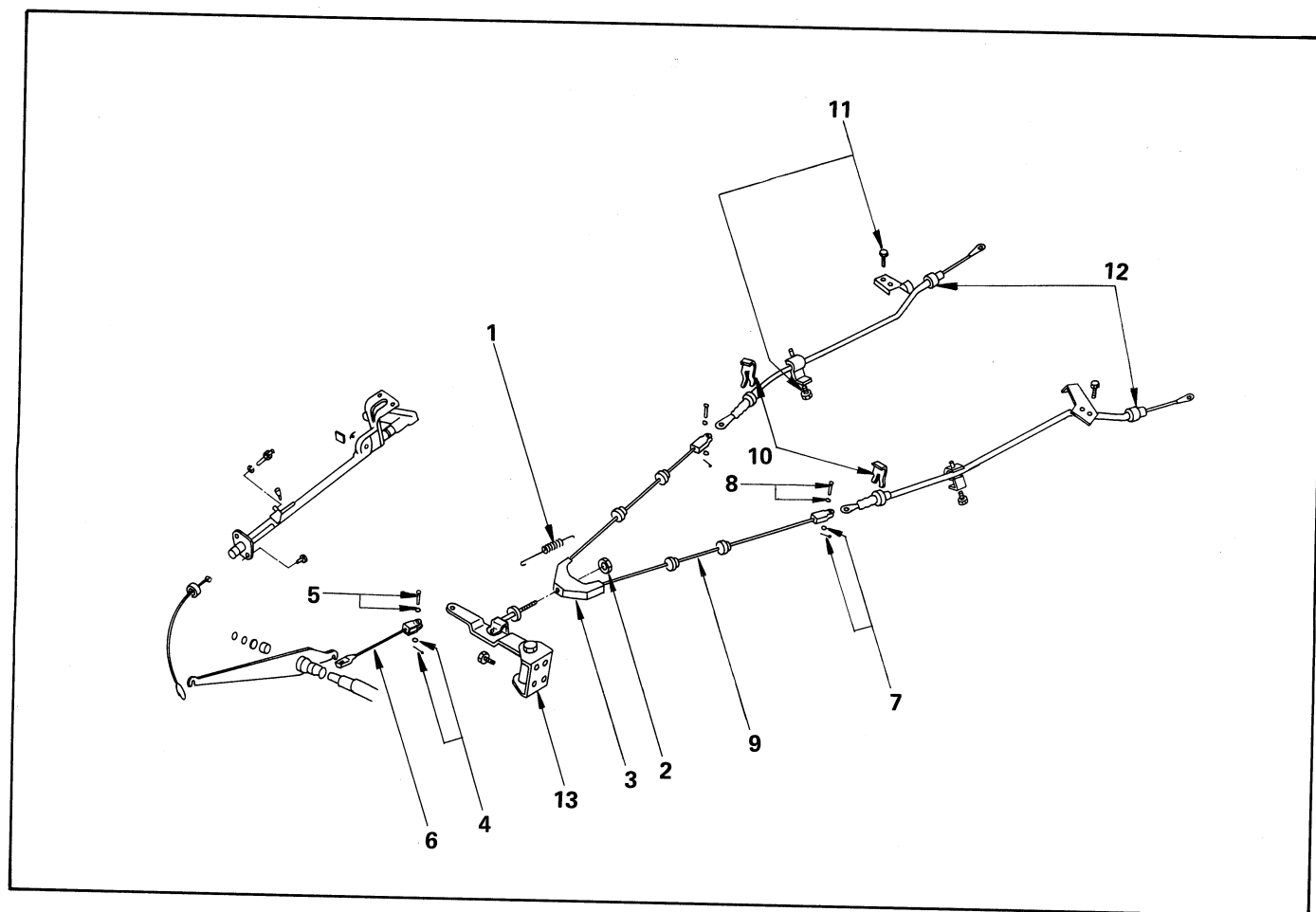
Removal steps

1. Cable front, relay lever side
2. Bolt ; bracket to dash
3. Bolt ; bracket to fascia panel
4. Parking brake stem assembly

Installation steps

To install, follow the removal procedure in reverse order.

FRONT AND REAR CABLE ASSEMBLY

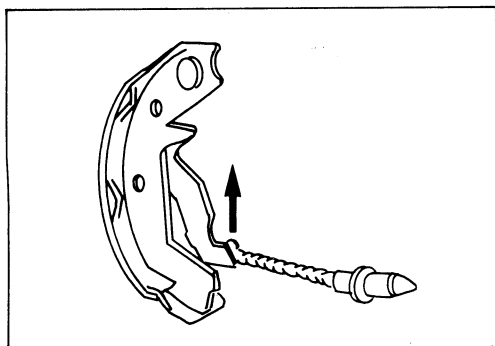


Removal steps

1. Return spring
2. Nut
3. Equalizer bracket
4. Cotter pin, with plan washer
5. Pin with curved washer
6. Cable ; front lower
7. Cotter pin, with plan washer
8. Pin with curved washer
9. 2nd intermediate cable
10. Clip
11. Clip ; fixing bracket
- ▲ 12. Cable assembly ; rear
13. 2nd relay lever assembly

Installation steps

To install, follow the removal procedure in reverse order.

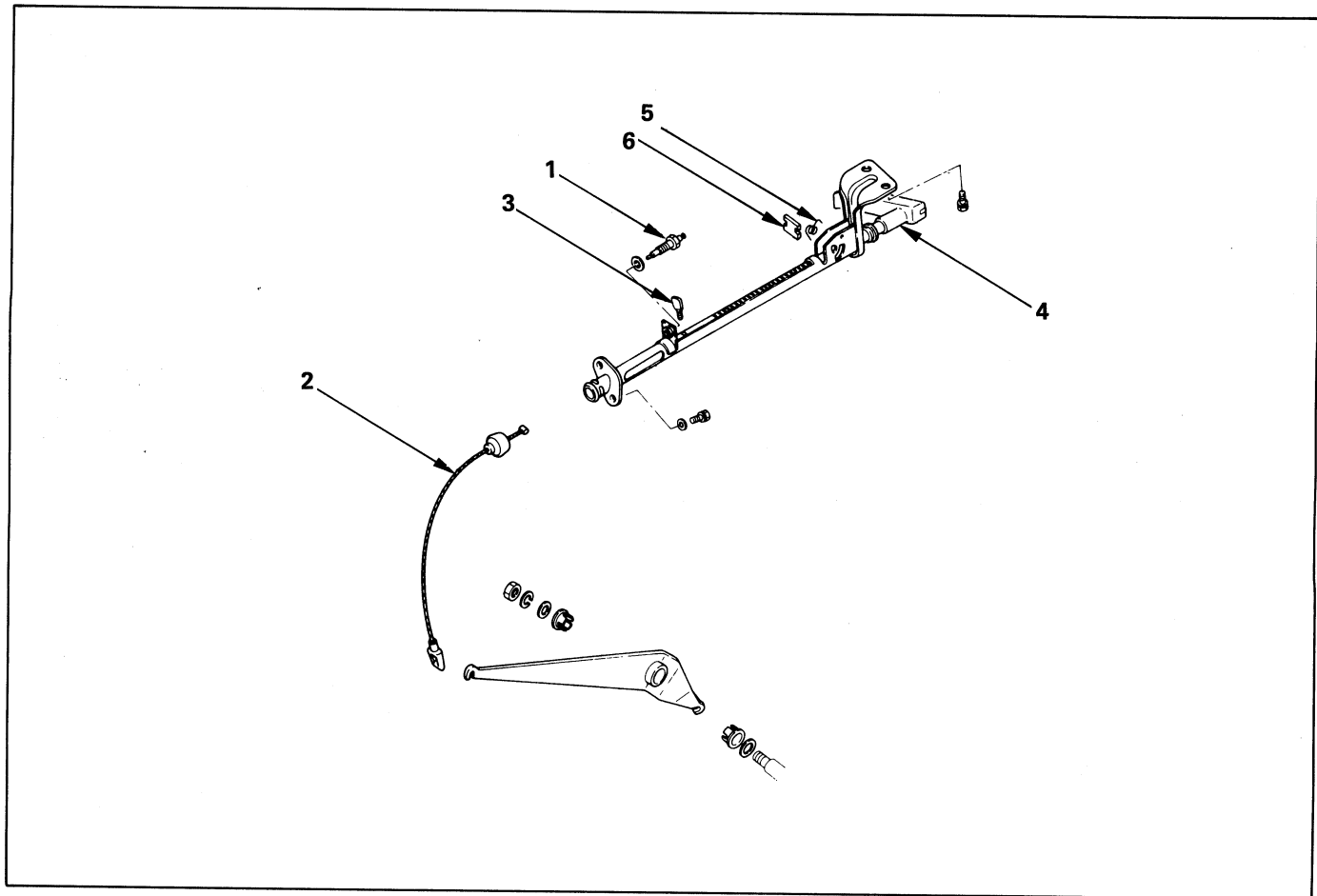
**Important operation****12. Cable assembly ; rear**

Remove the rear brake caliper disc plate, then disconnect the cable from the lever in the parking brake.



DISASSEMBLY AND REASSEMBLY

PARKING BRAKE STEM ASSEMBLY

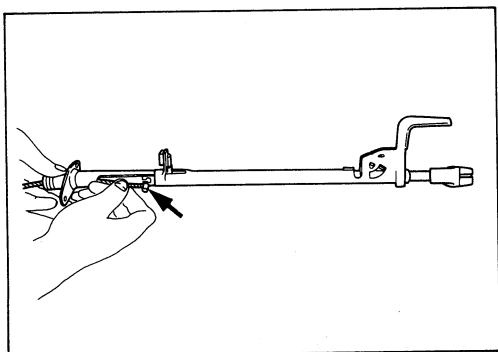


Disassembly steps

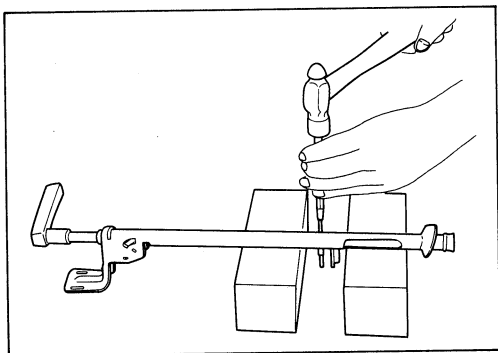
1. Switch ; parking brake
- ▲ 2. Cable ; front
- ▲ 3. Switch actuating pin
4. Stem
5. Spring
6. Pole

Reassembly steps

To reassemble, follow the disassembly procedure in reverse order.

**Important operation****2. Cable ; front**

Manually release the lever ratchet and depress the stem until the cable attachment at the lower end of the stem is visible. Remove the cable from the stem lower end.

**3. Switch actuating pin**

Align the parking brake switch actuating pole with the hole in the housing. Use a flat head punch, to drive out the pole.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



ADJUSTMENT PROCEDURE FOR PARKING BRAKE

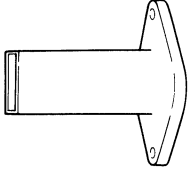
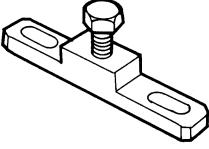
Refer to Section 00
"GENERAL INFORMATION" Ser-
vicing Parking Brake Adjustment
Procedure.

- Parking brake

DIAGNOSIS

Condition and Cause	Correction
Poor Brake Action Master cylinder faulty Power cylinder faulty Level of brake fluid in reservoir too low Air in hydraulic circuit Disc brake caliper faulty Rear brake wheel cylinder faulty Water or oil on brake pads or linings Brake pads or linings hardened Brake pads or linings in poor contact with rotor or brake drum Brake pads or linings worn Brake disc or drum rusted Check valve in vacuum hose faulty	Correct or replace Correct or replace Replenish and bleed Bleed Clean or replace Clean or replace Clean or replace Reface or replace Correct Replace Grind or replace Correct or replace
Brake Squeak Lack of grease between backing plates of pad and shim Brake pads or linings worn Brake pads or linings hardened Brake pads or linings in poor contact with rotor or brake drum Brake disc(s) warped, worn or damaged Disc brake anti-squeak shims fatigued Front hub bearings loose or preload is incorrect	Apply grease Replace Replace Correct Grind or replace Replace Adjust or replace
Brake Pull Tire inflation pressures unequal Front wheel alignment incorrect Water or oil on brake pads or linings Brake pads or linings hardened Brake pads or linings worn excessively Brake drum or rotor worn or scored Rear wheel cylinder or disc brake caliper malfunctioning Front hub bearing preload incorrect Brake pad or lining clearances unequal	Adjust Adjust Clean or replace Replace Replace Grind or replace Clean or replace Adjust or replace Clean or replace
Brake Dragged Brake pad or lining clearance insufficient Brake pedal free play insufficient Piston in master cylinder sticking Pistons in disc brake caliper sticking Pistons in rear brake wheel cylinders sticking Brake pads sticking in caliper Return springs weakened Parking brake binding Front hub bearing preload incorrect Rear brake shoes not returning Obstructions in hydraulic circuit Rotor warped excessively Rear brake drum distorted Piston cups swollen	Adjust Adjust brake pedal height or power cylinder operating rod Clean or replace Replace piston seals Clean or replace Clean Replace Overhaul rear brakes Adjust or replace Correct replace brake back plate, check automatic adjuster and replace as necessary Clean Grind or replace Grind or replace Replace brake fluid and piston cups
Excessive Brake Pedal Travel Air in hydraulic circuit Level of brake fluid in reservoir too low Master cylinder push-rod clearance excessive Leakage in hydraulic system	Bleed hydraulic circuit Replenish brake fluid reservoir to specified level and bleed hydraulic circuit as necessary. Adjust Correct or replace defective parts

SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-9504-01	Master-vac Spanner wrench
		J-22805-0	Holding spanner
		J-34350	Diaphragm remover

SECTION 10

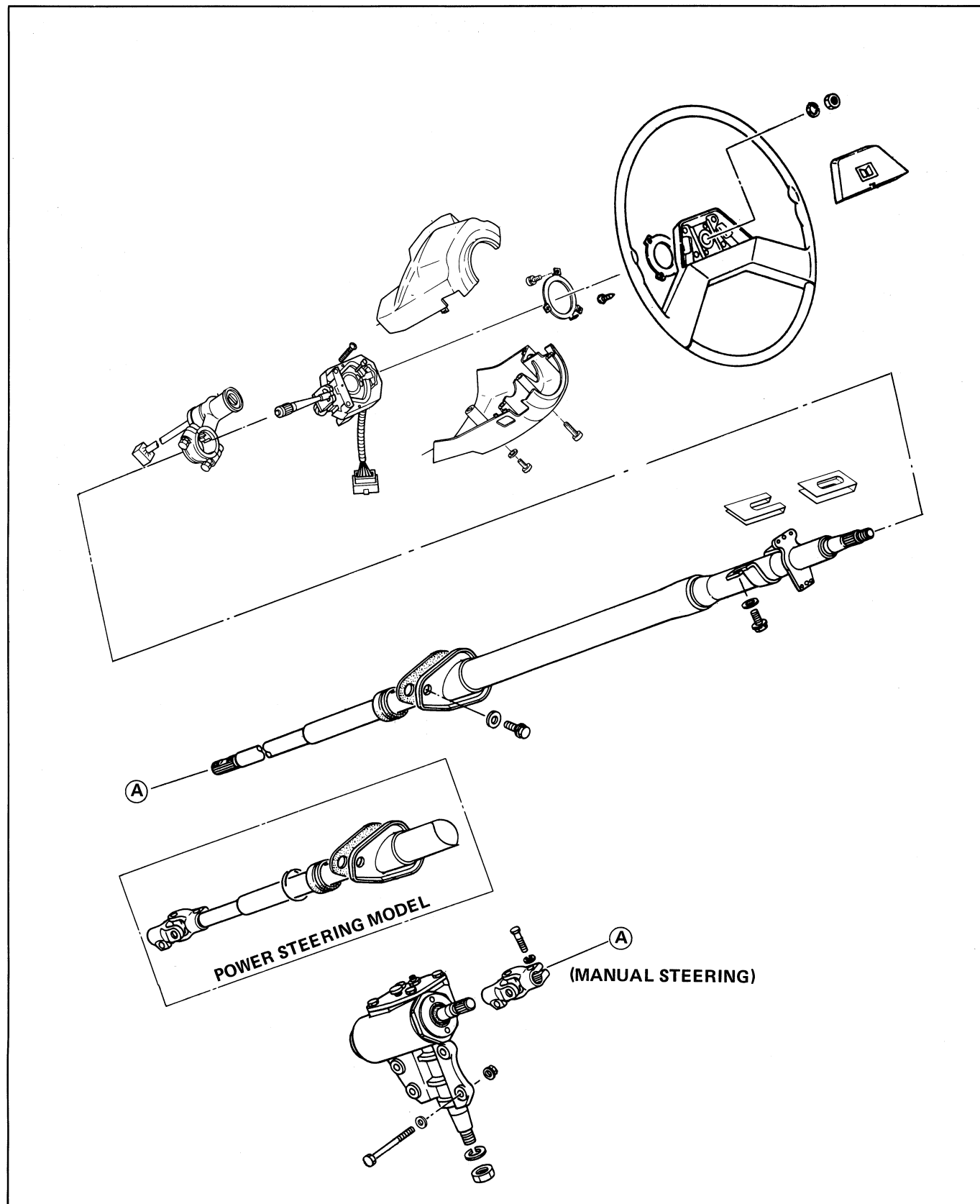
STEERING

INDEX

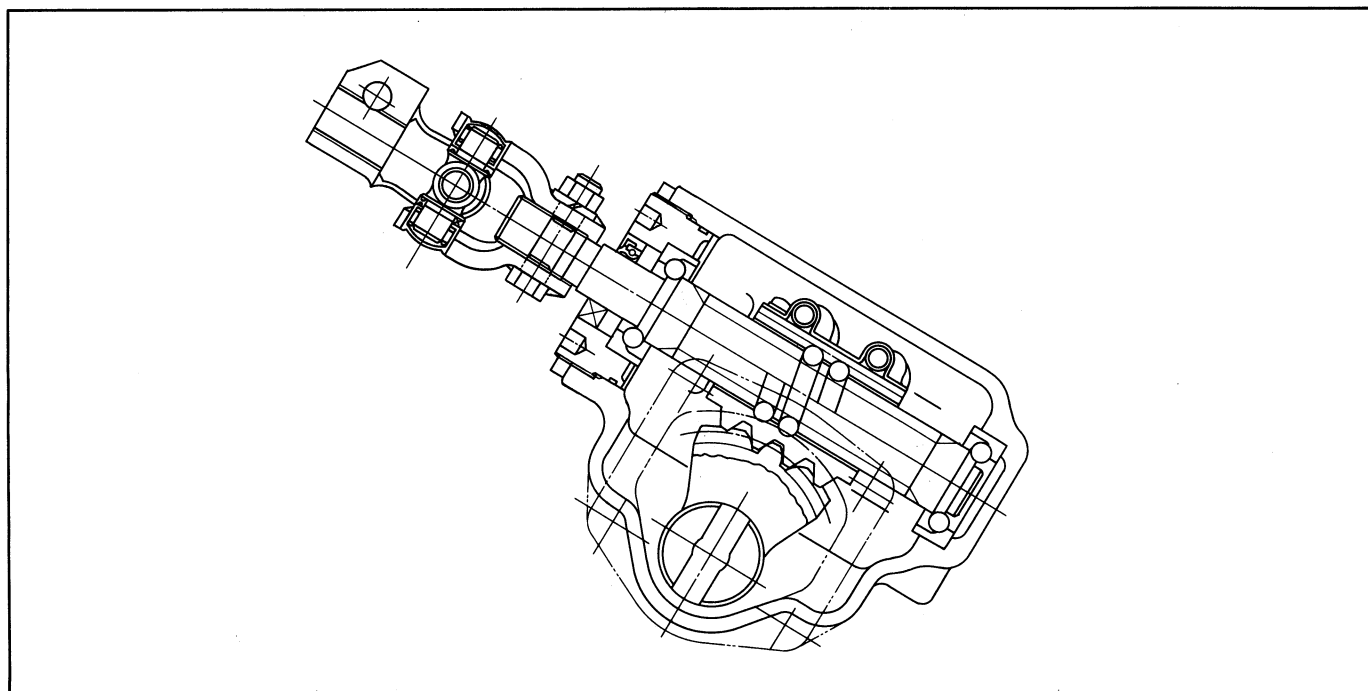
CONTENTS	PAGE
General description	10- 2
Main data and specifications	10- 7
Major parts ; fixing nuts and bolts	10- 8
Steering column	10-13
Steering unit	10-16
Power steering unit	10-25
Oil pump	10-32
Inspection of power steering system	10-37
Steering linkage	10-39
Diagnosis	10-45
Special tools	10-59

GENERAL DESCRIPTION

STEERING SHAFT AND COLUMN

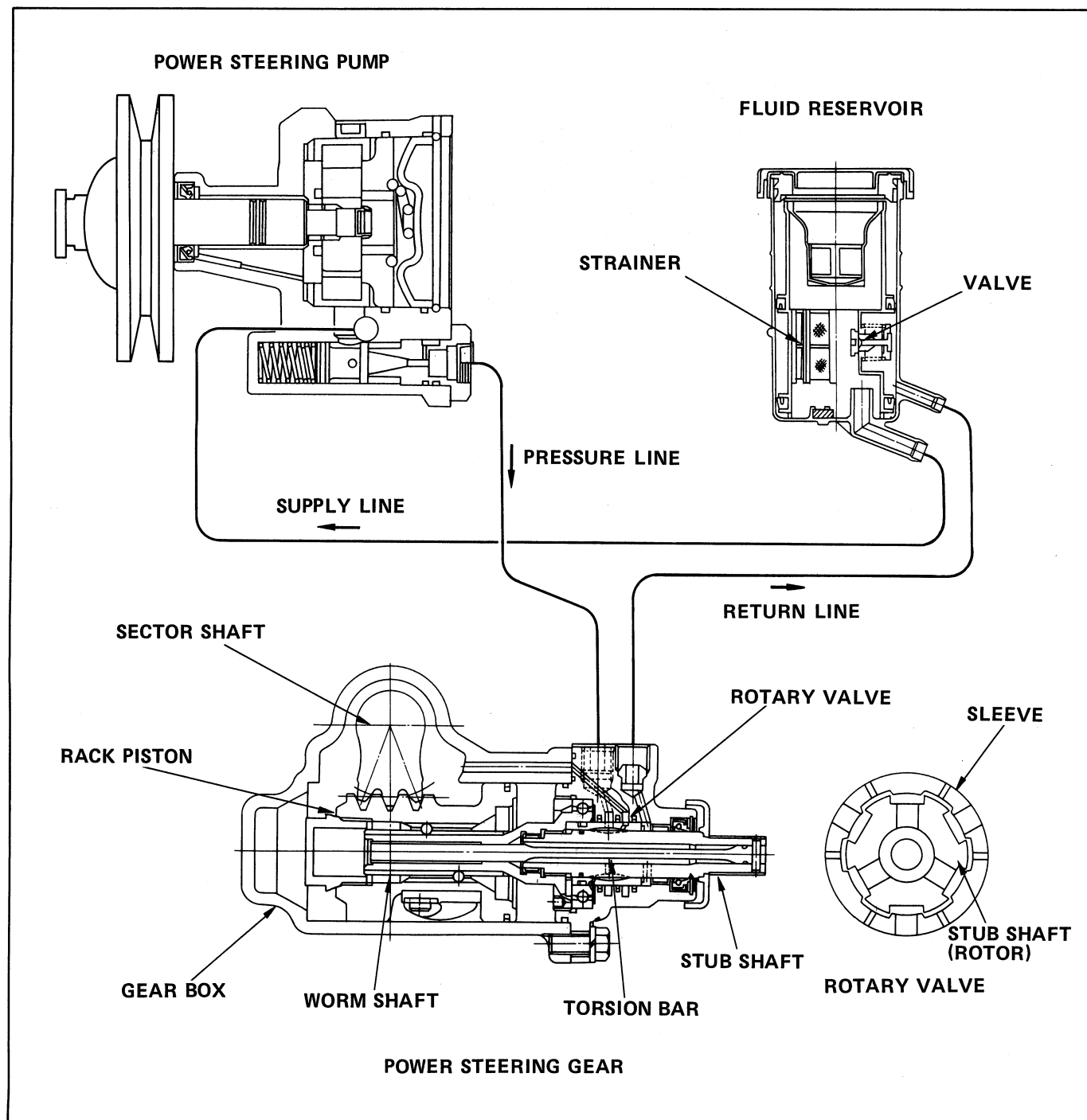


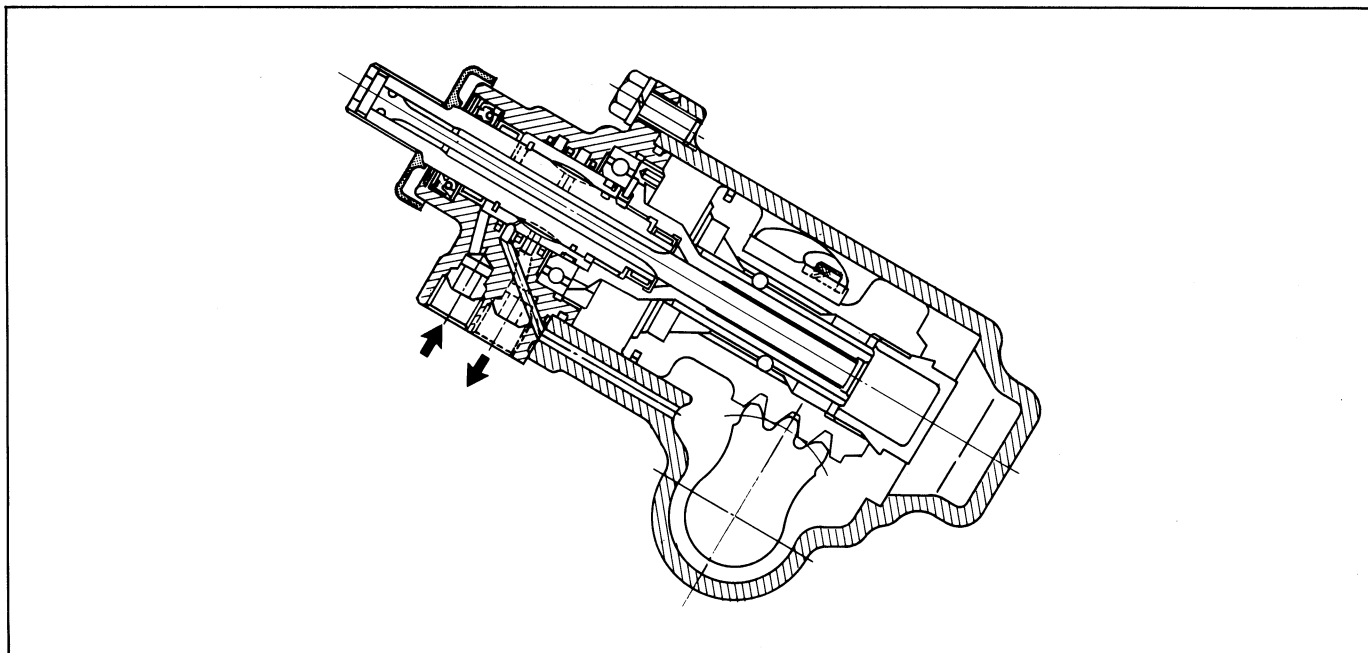
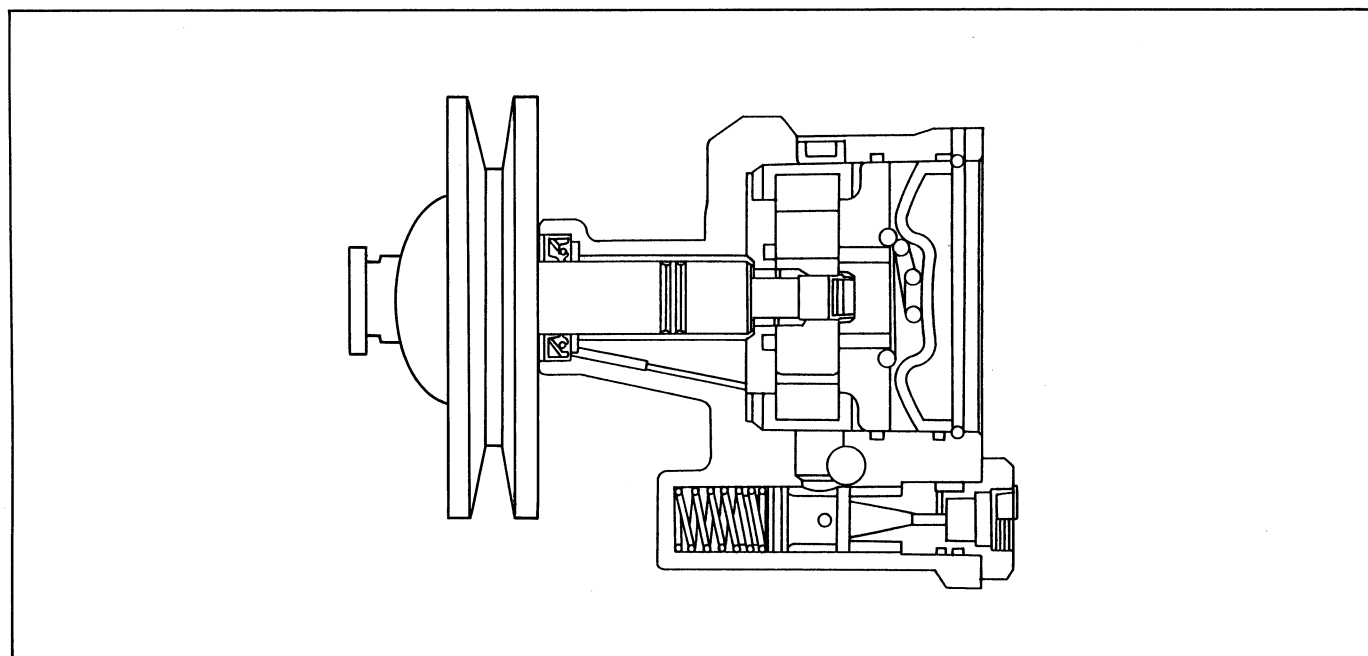
STEERING UNIT



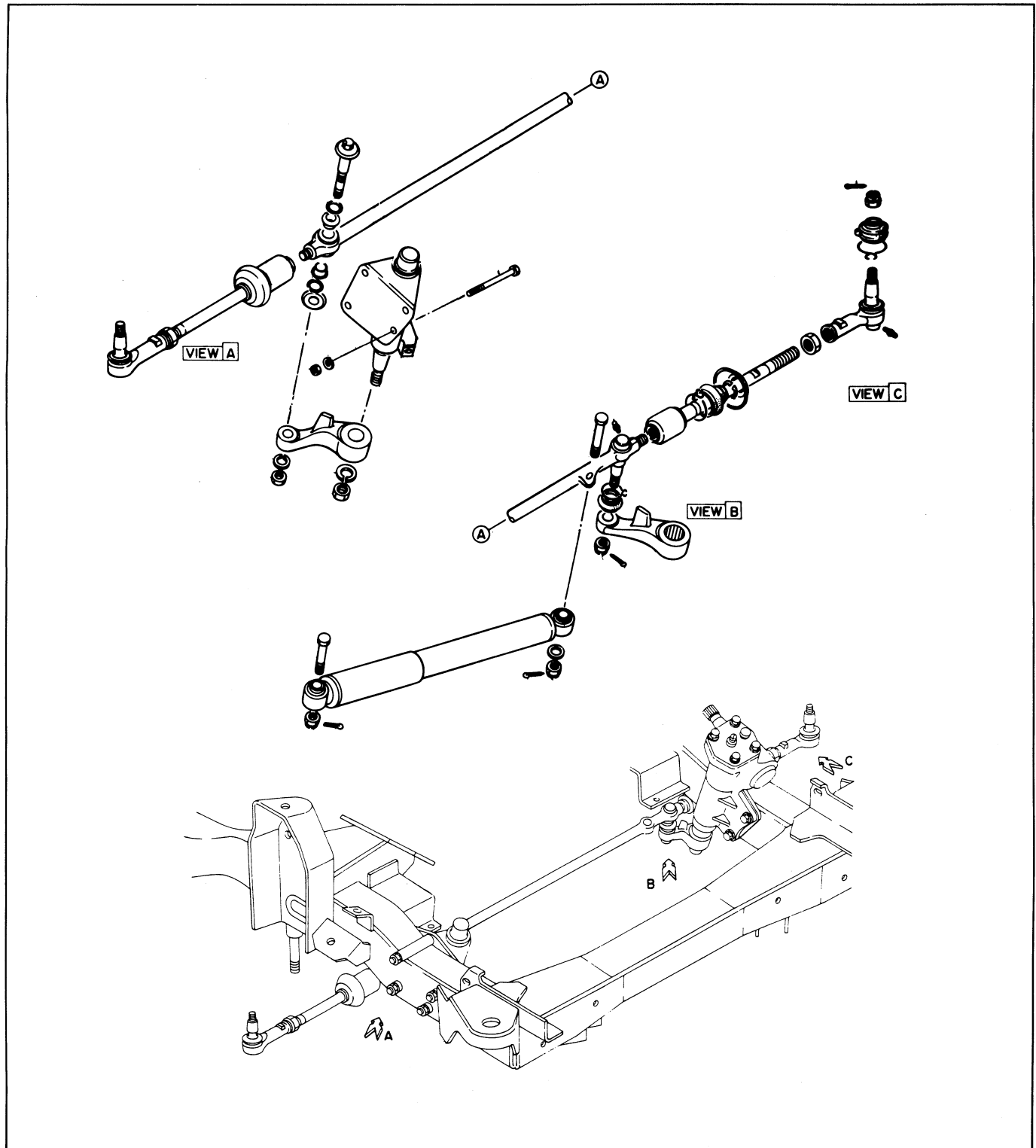
POWER STEERING SYSTEM (IF SO EQUIPPED)

POWER STEERING HYDRAULIC LINE



POWER STEERING UNIT**POWER STEERING OIL PUMP**

STEERING LINKAGE

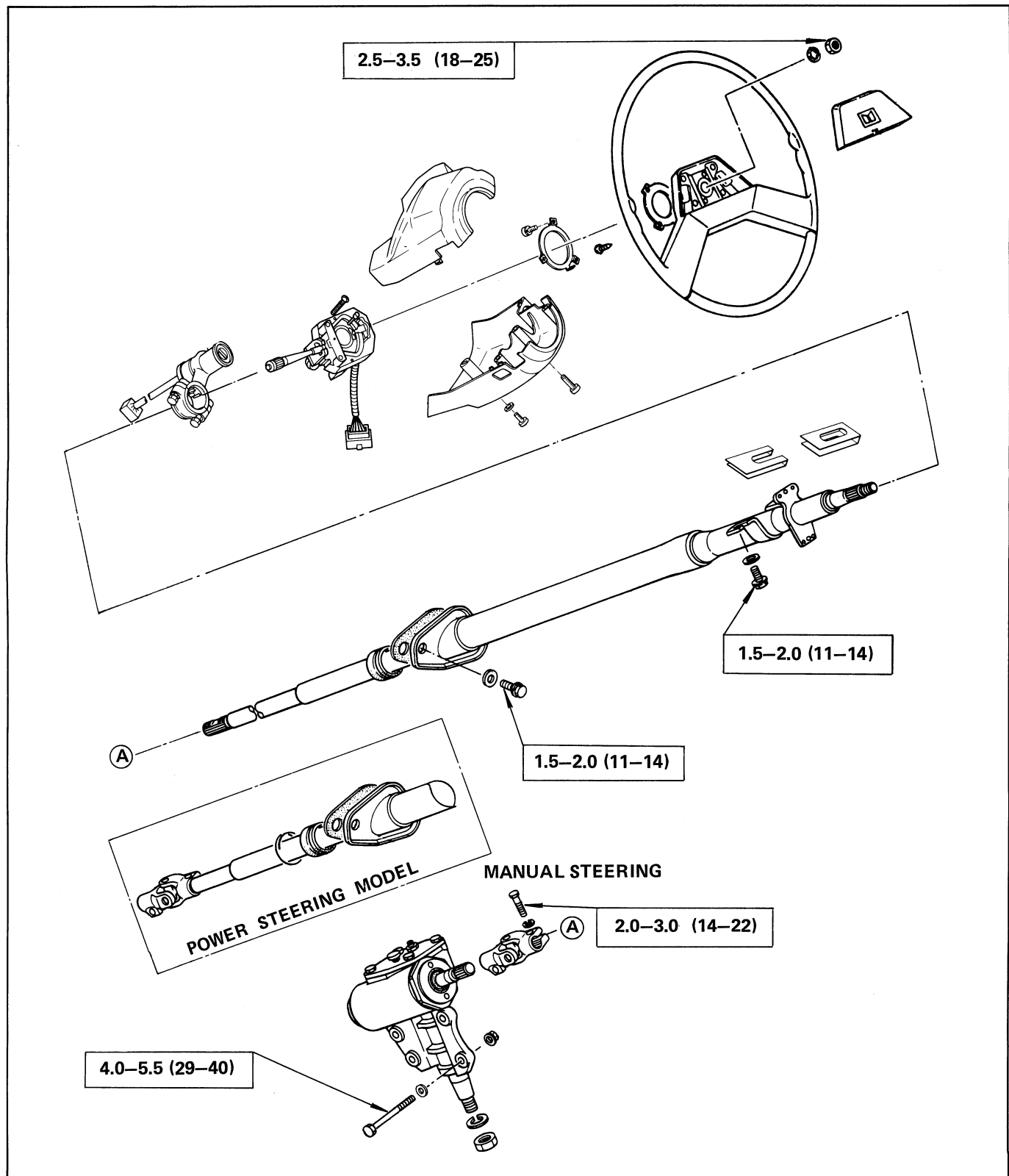


MAIN DATA AND SPECIFICATIONS

		Manual steering	Power steering
Unit type		Recirculating ball	Integral, ball screw
Gear ratio		26 — 30	22.4 : 1
Sector shaft operating angle	degree	64	60
Sector shaft backlash (Preload)	kg-m(ft.lbs.)	0.05 — 0.1 (0.36 — 0.72)	0.47 — 0.77 (3.40 — 5.57)
Maximum oil pressure	kg/cm ² (Psi)	—	80 (1138)
Oil pump type		—	Vane
Steering wheel - Diameter	mm(in.)	382 (15.04)	
Free play	mm(in.)	10 — 30 (0.394 — 1.181)	10 (0.394)
Oil capacity	liters(us pint)	0.2 (0.423) SAE 90 or equivalent	1.0 (2.113) (Total) ATF

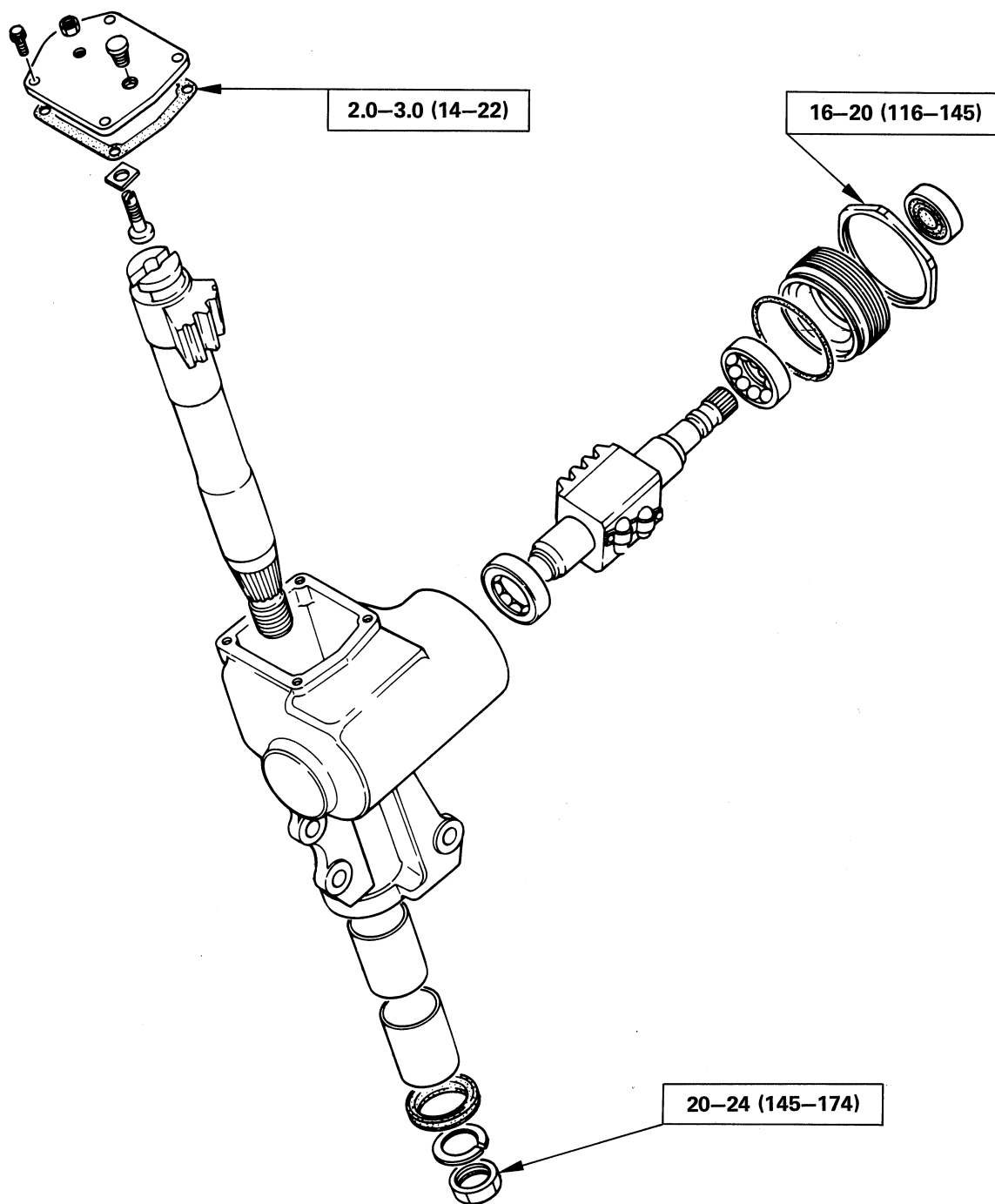
MAJOR PARTS ; FIXING NUTS AND BOLTS

STEERING SHAFT AND COLUMN



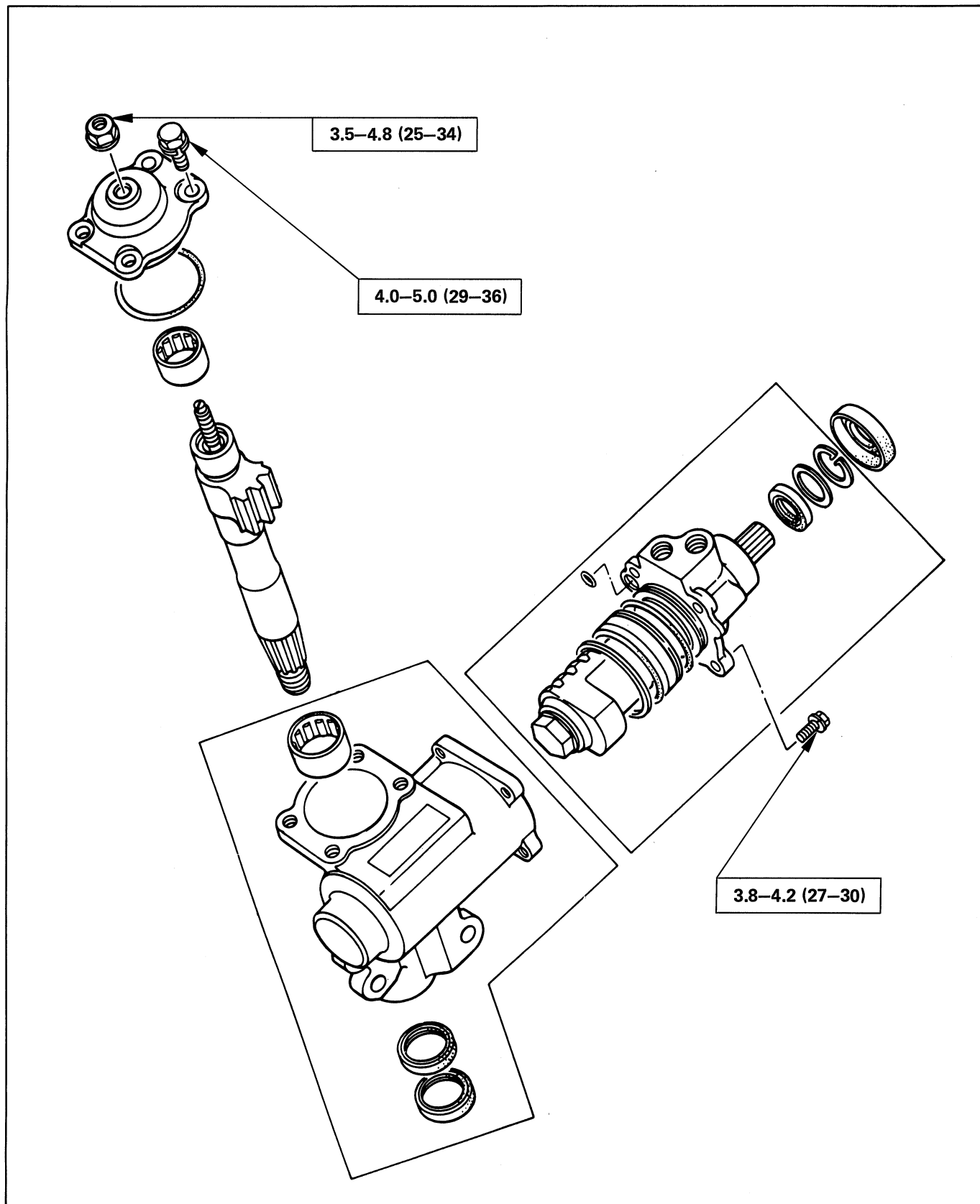
STEERING UNIT (MANUAL)

kg-m(ft.lbs.)



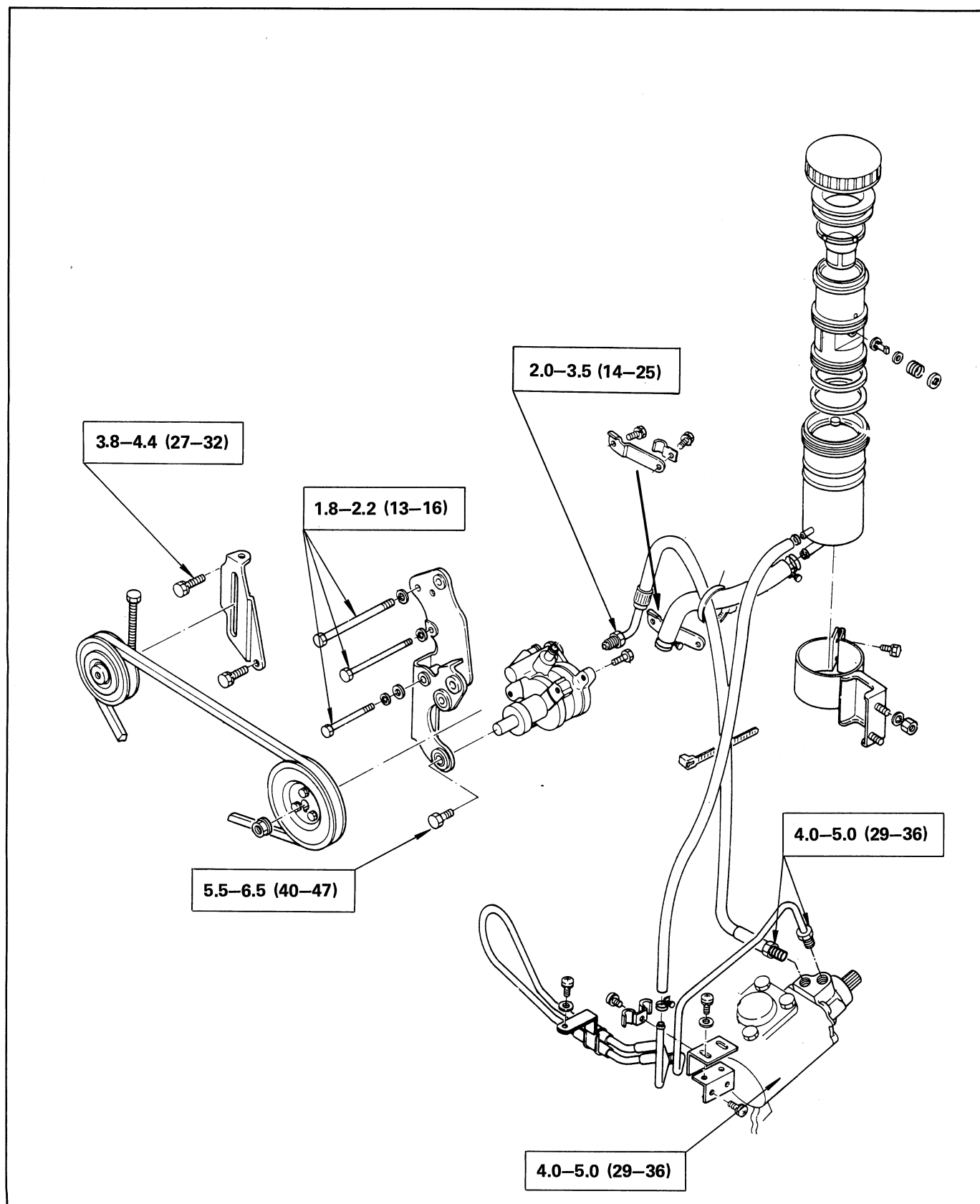
STEERING UNIT (POWER)

kg-m(ft.lbs.)



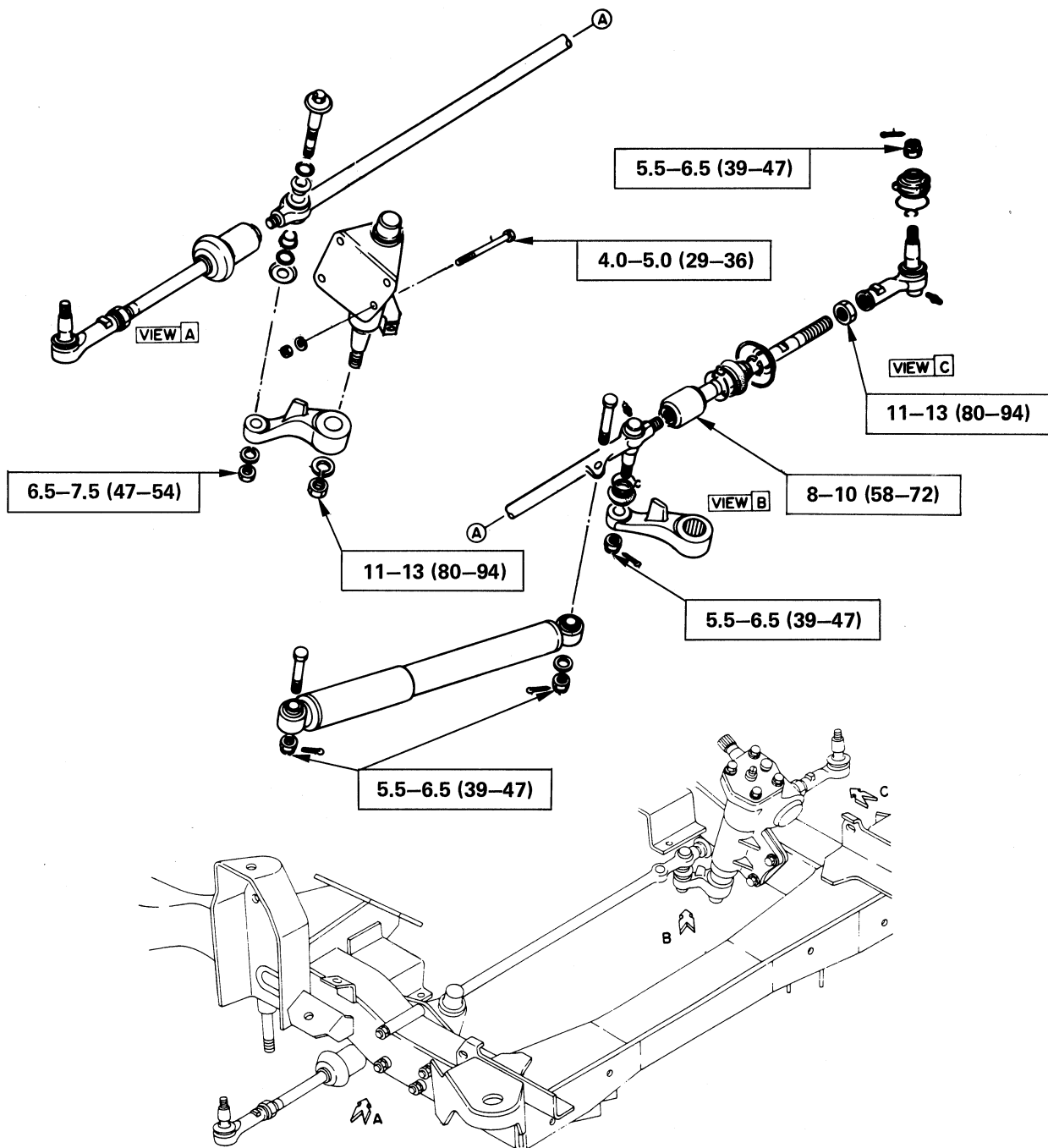
POWER STEERING HYDRAULIC LINE

kg-m(ft.lbs.)



STEERING LINKAGE

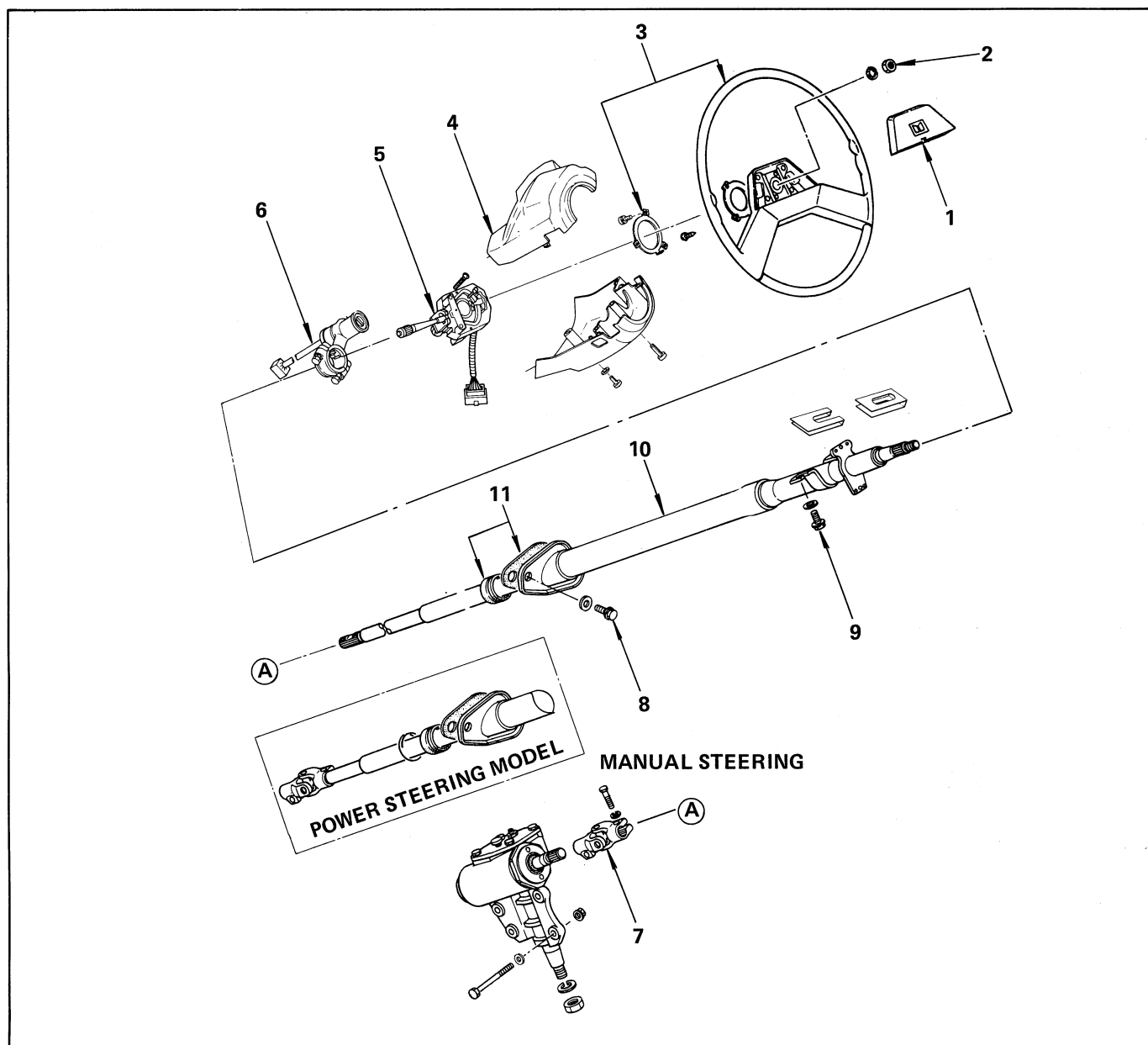
kg-m(ft.lbs.)



STEERING COLUMN



REMOVAL AND INSTALLATION



Removal steps

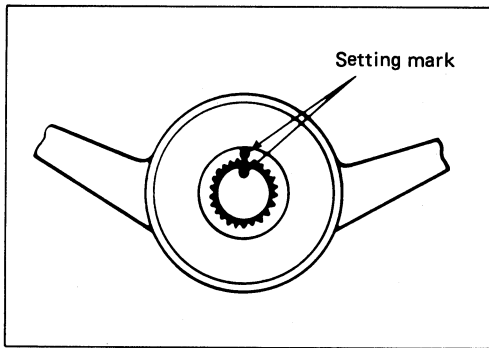
1. Pad assem, steering wheel
2. Nut
- ▲ 3. Steering wheel
4. Steering cowl
5. Combination switch
6. Steering lock
- ▲ 7. Universal joint
8. Bolts, steering bracket
9. Bolts, steering column to dash panel
10. Steering column assembly
11. Packing and grommet

Installation steps

11. Packing and grommet
10. Steering column assembly
- ▲ 9. Bolts, steering column to dash panel
8. Bolts, steering bracket
- ▲ 7. Universal joint
6. Steering lock
5. Combination switch
4. Steering cowl
- ▲ 3. Steering wheel
- ▲ 2. Nut
1. Pad assembly, steering wheel

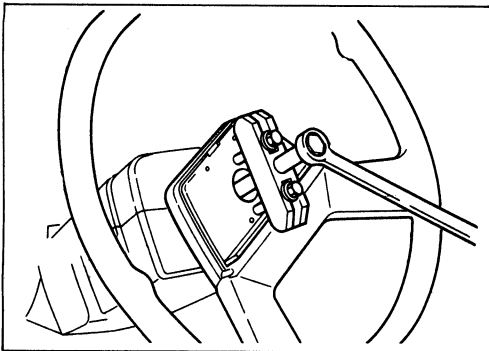


Important operations — Removal



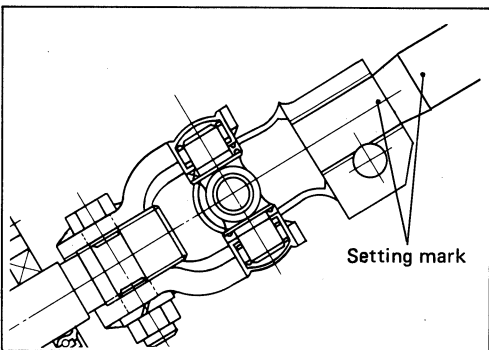
3. Steering wheel

- (1) Apply a setting mark across the steering wheel and shaft so parts can be reassembled in their original position.



- (2) Puller : J-29752

Note: Never apply a shock to the steering wheel in direction of the shaft by using a hammer or other impact tools in an attempt to remove the steering wheel.
The steering shaft is designed as energy absorbing unit.

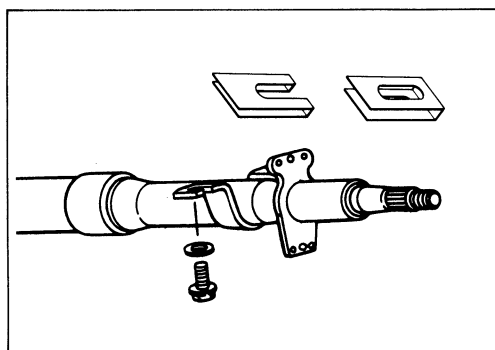


7. Universal joint

Apply a setting mark across the universal joint and steering shaft to reassemble of the parts in their original position.

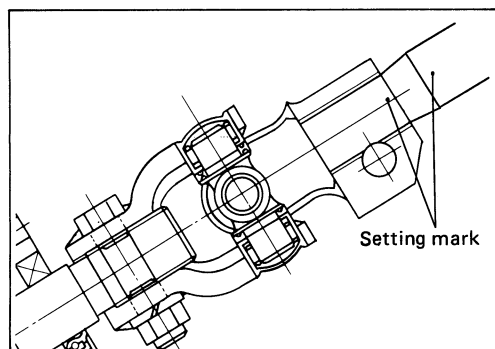


Important operations — Installation



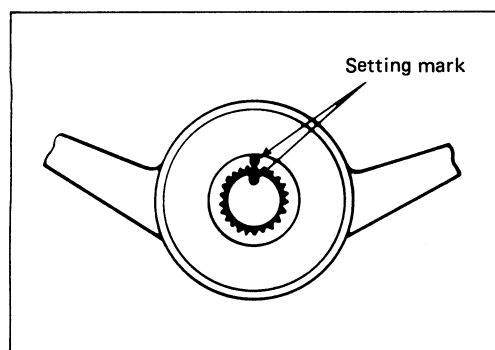
9. Bolts

Torque	kg-m(ft.lbs.)	2.0 — 3.0 (14 — 22)
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7. Universal joint

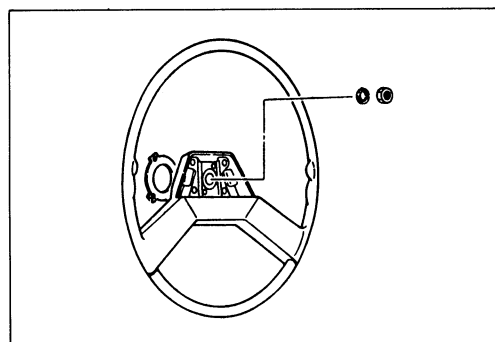
Align the setting marks applied at removal.



3. Steering wheel

- (1) Align the setting marks applied at removal
- (2) Apply grease to contact ring.

Note: Never apply shock to the steering wheel in direction of the shaft by using a hammer or other impact tools in an attempt to remove the steering wheel.
The steering shaft is designed as an energy absorbing unit.



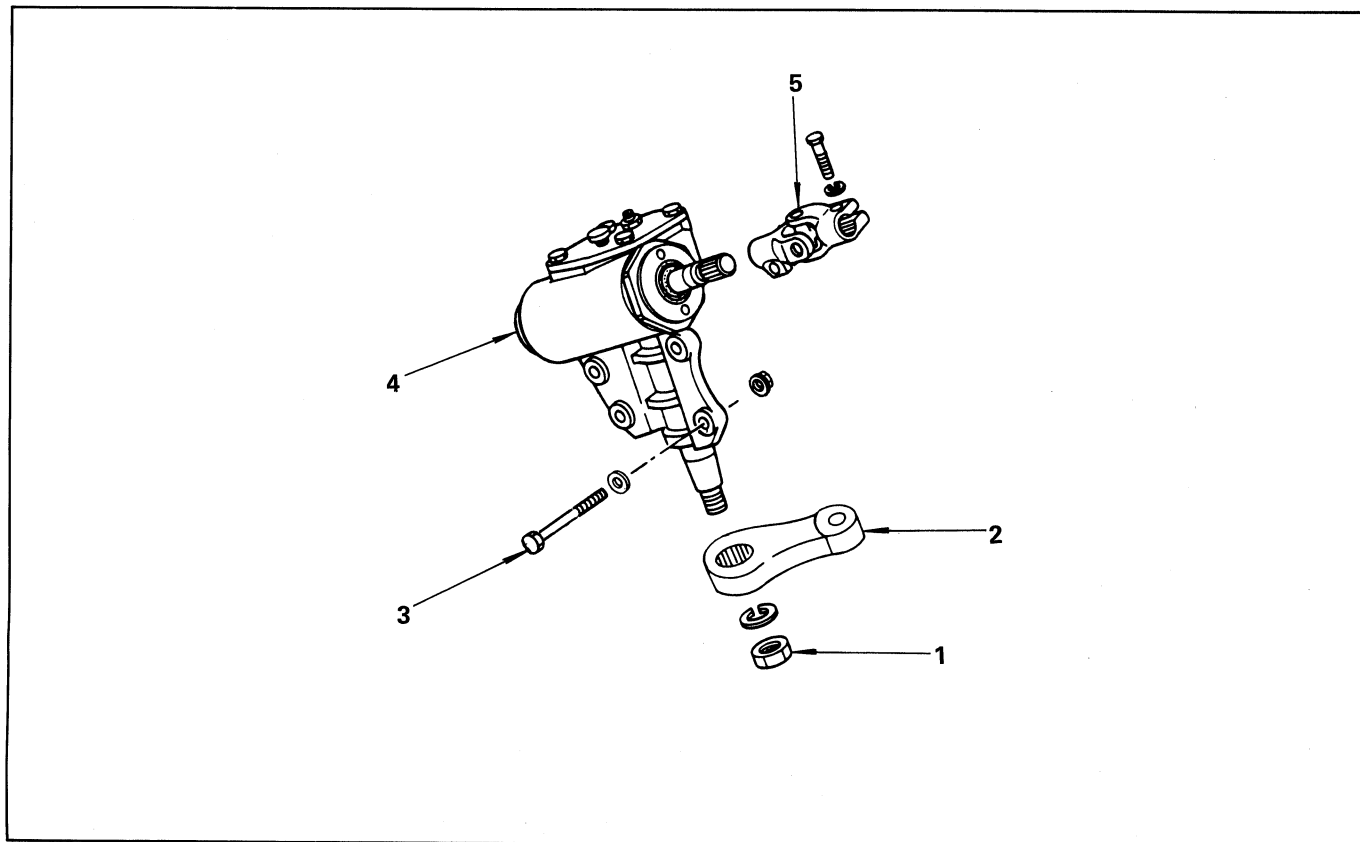
2. Nut

Torque	kg-m(ft.lbs.)	2.5 — 3.5 (18 — 25)
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STEERING UNIT



REMOVAL AND INSTALLATION



Removal steps

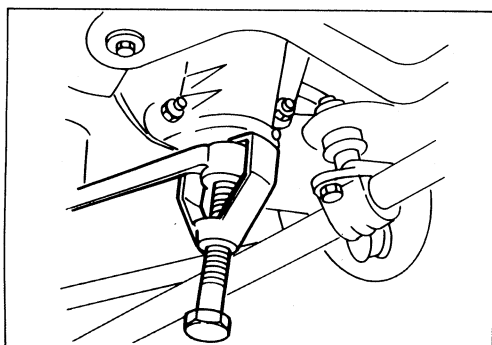
1. Nut
- ▲ 2. Pitman arm
3. Bolt
4. Unit assembly
- ▲ 5. Universal joint assembly

Installation steps

- ▲ 5. Universal joint assembly
4. Unit assembly
- ▲ 3. Bolt
- ▲ 2. Pitman arm
- ▲ 1. Nut

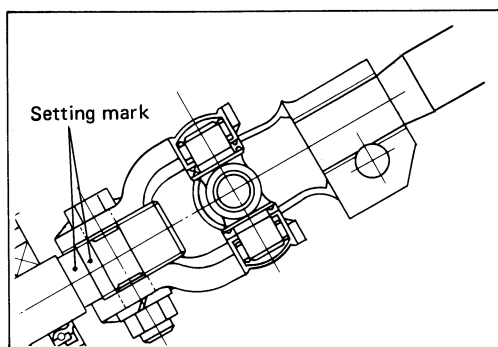


Important operations — removal



2. Pitman arm

Remover : J-29107

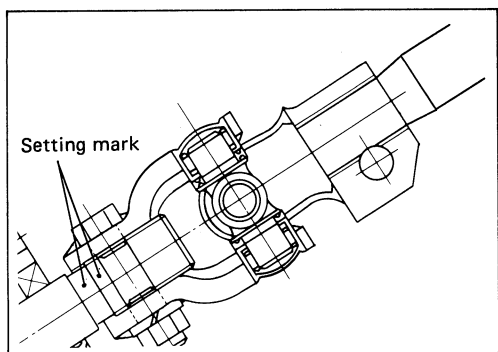


5. Universal joint assembly

Apply a setting mark across the universal joint and worm shaft to ensure reassembly the parts in their original position.



Important operations — installation



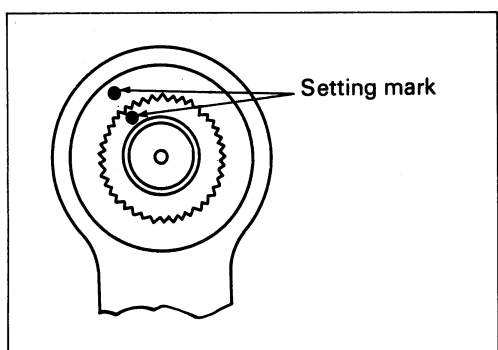
5. Universal joint assembly

Align the setting mark applied at removal



3. Bolt

Torque	kg-m(ft.lbs.)	4.0 — 5.5 (29 — 40)
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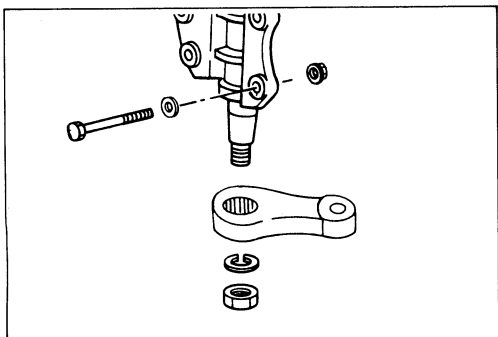
2. Pitman arm

Align the notched tooth



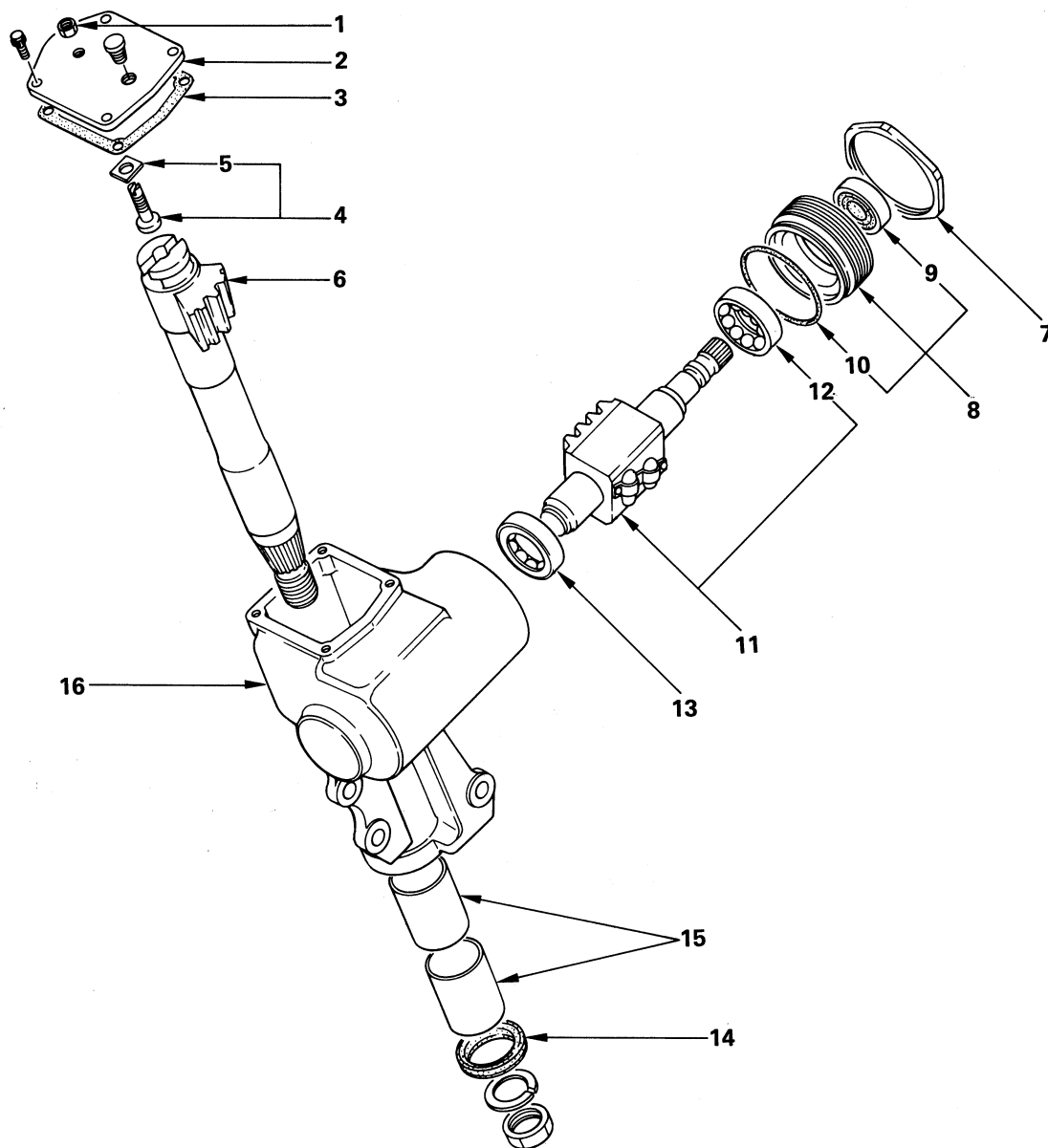
1. Nut

Torque	kg-m(ft.lbs.)	20 — 24 (145 — 174)
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DISASSEMBLY

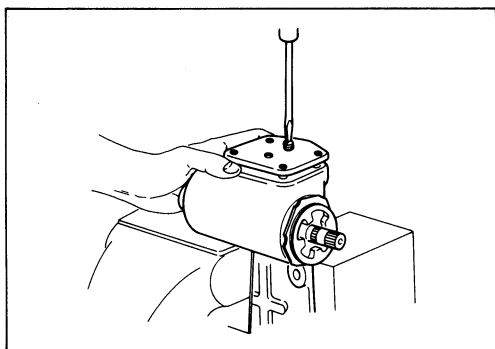


Disassembly steps

- | | |
|-------------------|-------------------------------|
| 1. Lock nut | 9. Oil seal |
| ▲ 2. Side cover | 10. O-ring |
| 3. Gasket | ▲ 11. Ball nut and worm shaft |
| 4. Adjust screw | 12. Bearing |
| 5. Adjust shim | 13. Bearing |
| ▲ 6. Sector shaft | 14. Oil seal |
| ▲ 7. Lock nut | 15. Bushing |
| ▲ 8. End cover | 16. Gear box |

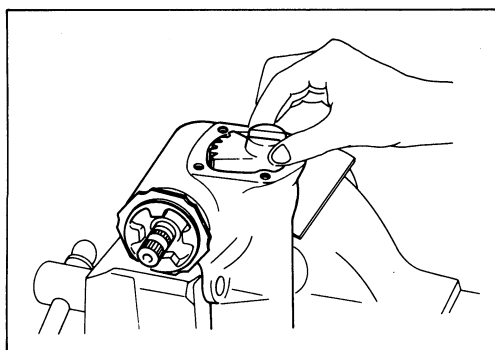


Important operations



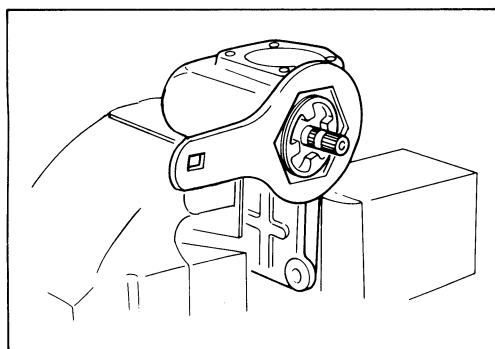
2. Side cover

- (1) Turn the adjust screw counter-clockwise slightly, then remove the side cover fixing bolt.
- (2) Turn the adjust screw clockwise with the side cover kept from turning.



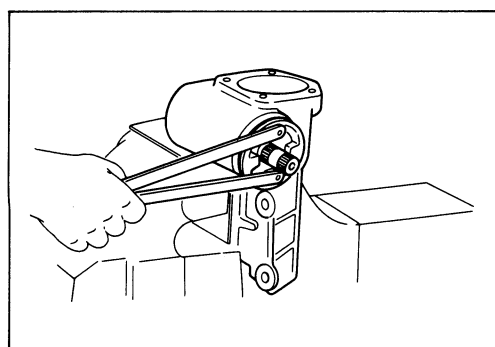
6. Sector shaft

Hold the sector shaft in straight-ahead position when removing it from the gear box. Do not drive the sector shaft off the gear box with a hammer or other impact tools.



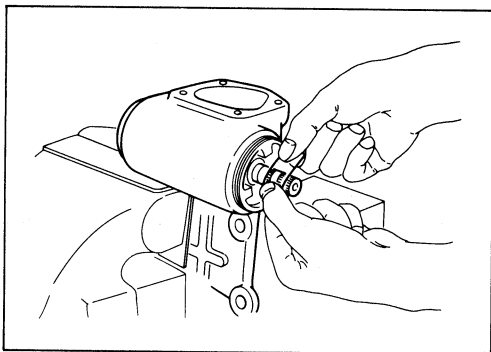
7. Lock nut

Wrench : J-29753

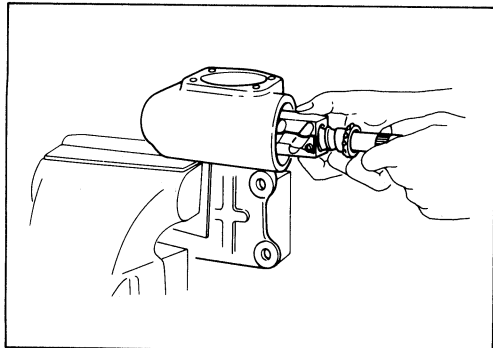


8. End cover

- (1) Remover : J-7624



- (2) When removing, take care so as not to cause damage to the oil seal.
Tapping the splines will provide some protection.



11. Ball-nut and worm shaft

Always keep the ball-nut assembly in a horizontal position. Do not hold it vertically, or the ball-nut will slide out.



INSPECTION AND REPAIR

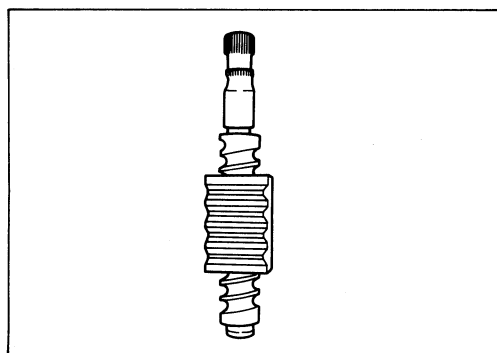
Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Bearing
- Oil seal, bushing
- Ball nut and worm shaft
- Sector shaft
- Gear box



Visual check

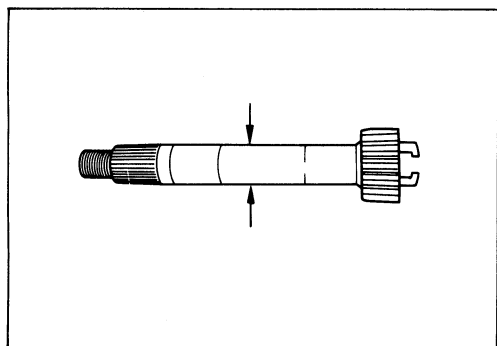
Inspect the following parts for wear, damage or other abnormal conditions.



Ball-nut rotation

Hold the worm shaft vertically and see if the ball-nut lowers with the turning motion smoothly. If lowering of the ball-nut with its own weight is rough, check the worm shaft for bending and the ball-groove for burns, dents, and presence of foreign matter.

Note: When making a test on the ball nut assembly, take care not to strike ball nut against the end of worm shaft, or damage to the ball tubes will result.

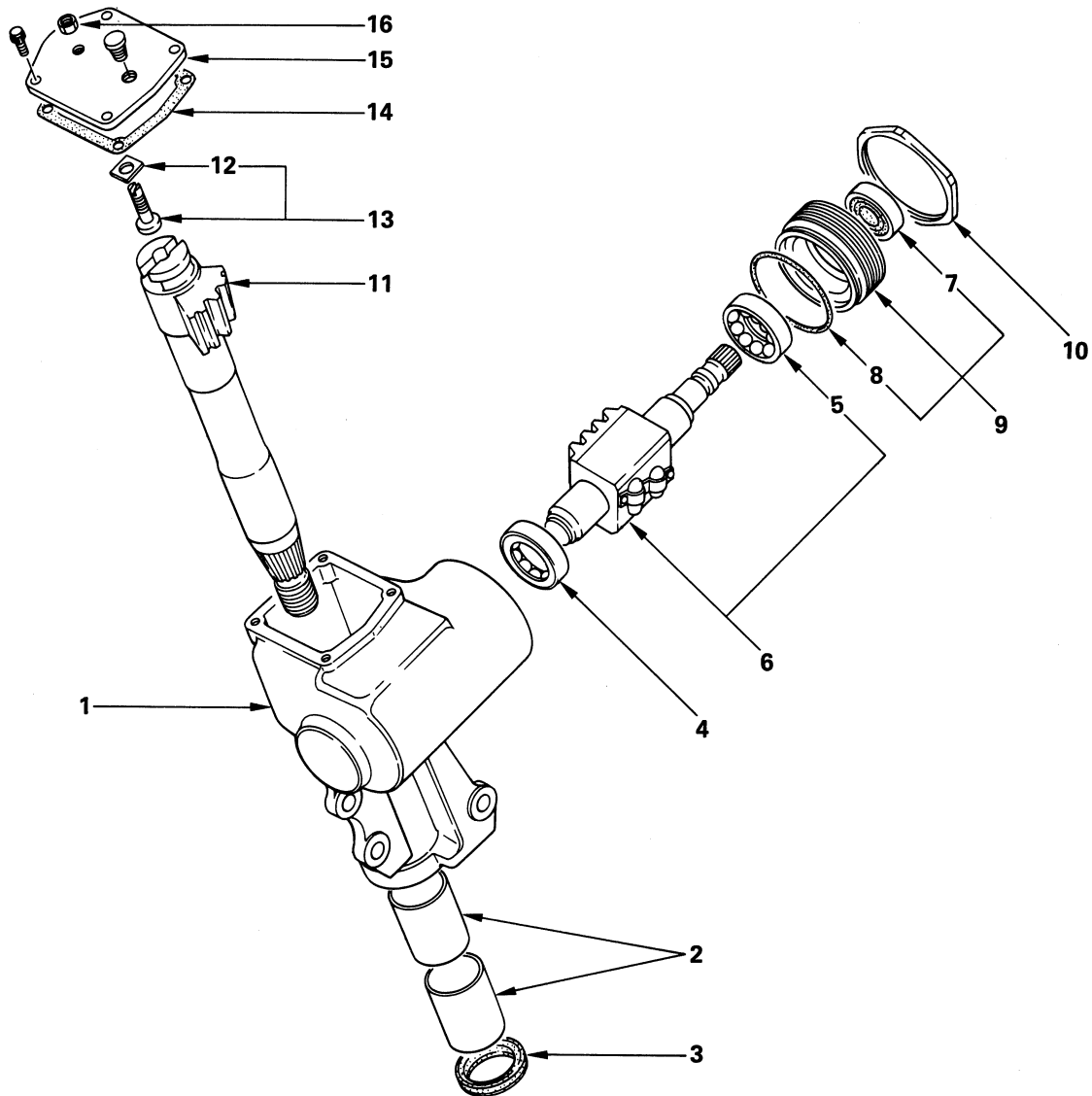


Sector shaft outside diameter

mm(in.)	
Standard	Limit
28.6 (1.126)	28.3 (1.114)



REASSEMBLY

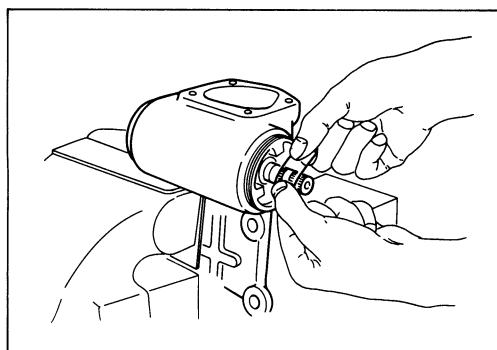


Reassembly steps

1. Gear box
2. Bushing
3. Oil seal
4. Bearing
5. Bearing
6. Ball nut and worm shaft
7. Oil seal
8. O-ring
9. End cover
10. Lock nut
11. Sector shaft
12. Adjust shim
13. Adjust screw
14. Gasket
15. Side cover
16. Lock nut

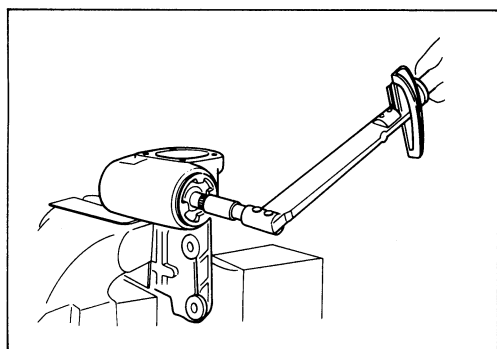


Important operations



9. End cover

- (1) When installing, take care so as not to cause damage to the oil seal.
Tapping the splines will provide some protection.

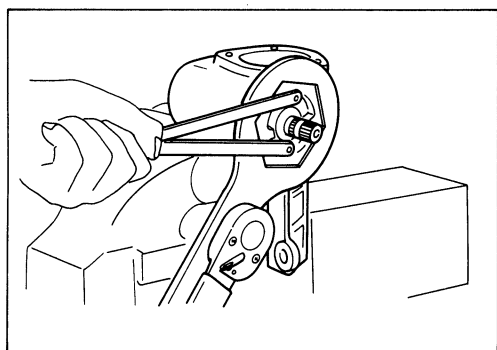


- (2) Adjust the bearing preload by using special tool.

Preload	kg-m(ft.lbs.)	0.03 — 0.06 (0.22 — 0.43)
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- (3) Socket : J-29754



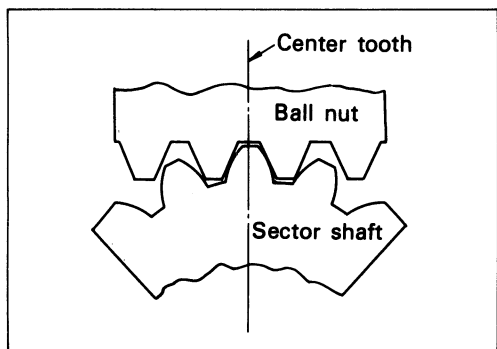
10. Lock nut

Torque	kg-m(ft.lbs.)	16 — 20 (116 — 115)
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Note: After tightening, check the bearing preload.

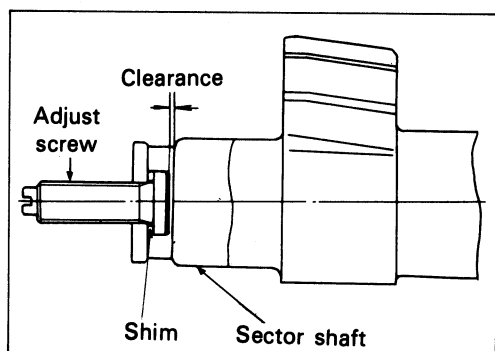


Preload	kg-m(ft.lbs.)	0.03 — 0.06 (0.22 — 0.43)
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11. Sector shaft

Align the center tooth of ball-nut with that of the sector shaft.

**12. Adjust shim**

Adjust the clearance and check that the adjust screw slides freely.

Clearance	mm(in.)	0.1 (0.004)
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Adjust shims available mm(in.)

1.53 (0.060), 1.56 (0.061), 1.59 (0.063), 1.62 (0.064),
1.65 (0.065),

**14. Gasket****15. Side cover**

Apply liquid gasket to the jointing face of each part.

**16. Lock nut**

Adjust the backlash between the sector gear and ball-nut.

- (1) Set the sector shaft in a straight ahead position.
- (2) With the adjust screw, adjust the backlash to the specification

Backlash (Preload)	kg-m(ft.lbs.)	0.05 — 0.1 (0.36 — 0.72)
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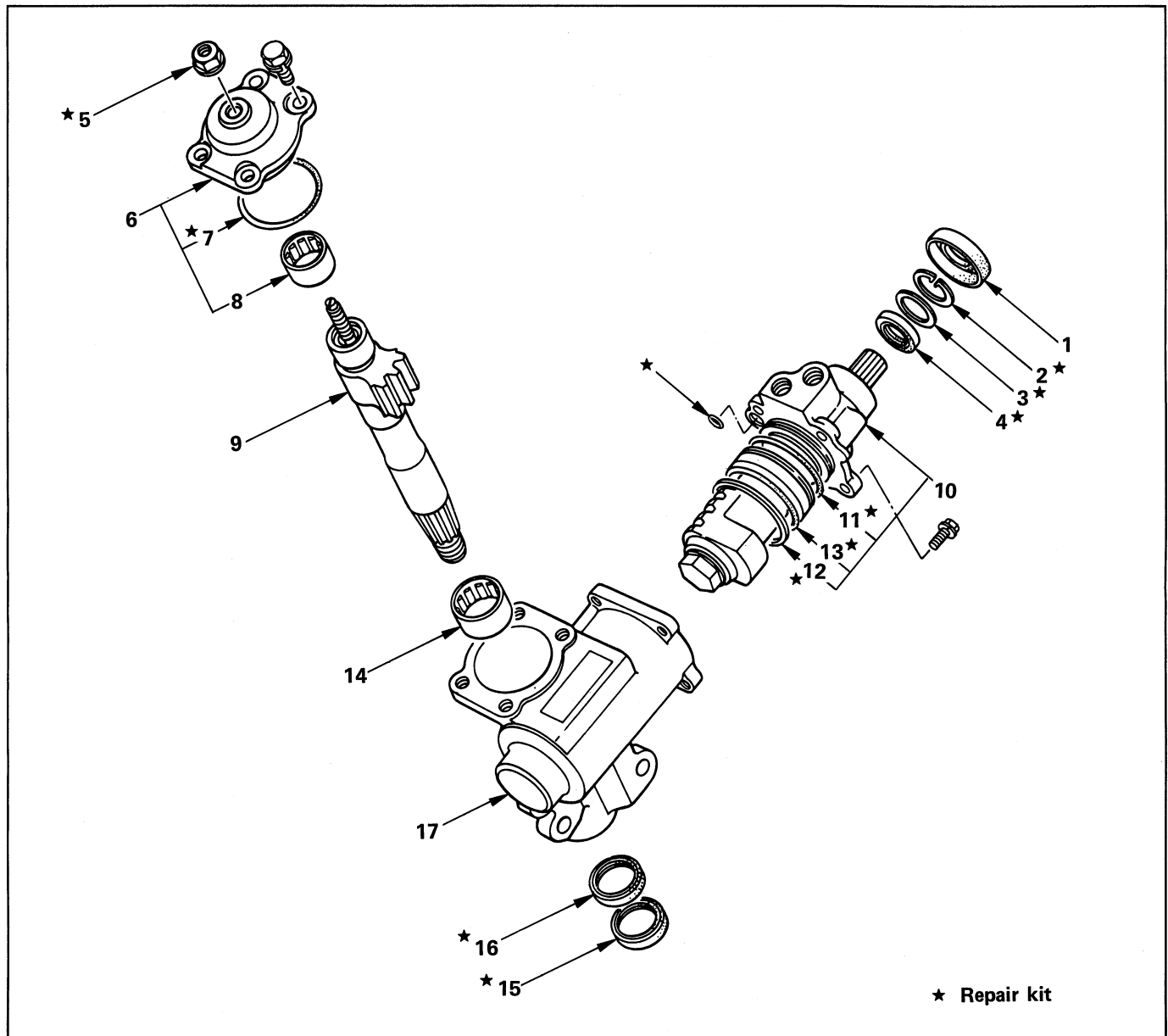
- (3) Lock adjust screw with lock nut.

Torque	kg-m(ft.lbs.)	2.0 — 3.0 (14 — 22)
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POWER STEERING UNIT



DIASSEMBLY



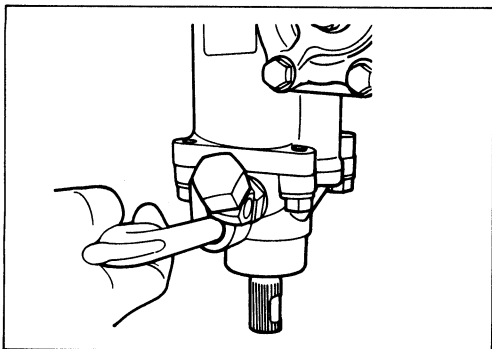
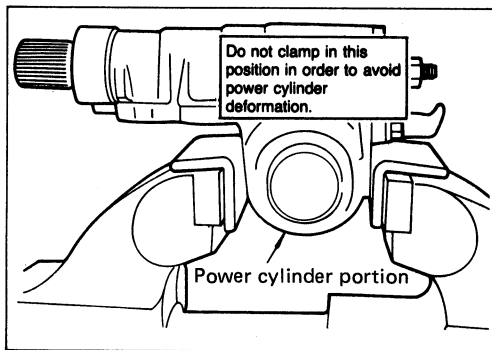
Disassembly steps

- | | |
|-------------------------|---|
| 1. Dust cover | ▲ 10. Ball nut and valve housing assembly |
| 2. Retaining ring | 11. O-ring |
| 3. Back up ring | 12. Seal ring |
| ▲ 4. Oil seal | 13. O-ring |
| ▲ 5. Lock nut | 14. Needle bearing |
| ▲ 6. Top cover assembly | 15. Dust seal |
| 7. O-ring | 16. Seal ring |
| 8. Needle bearing | 17. Gear box |
| ▲ 9. Sector shaft | |



Important operations

Avoid clamping the steering gear assembly in a vise at the power cylinder portion.

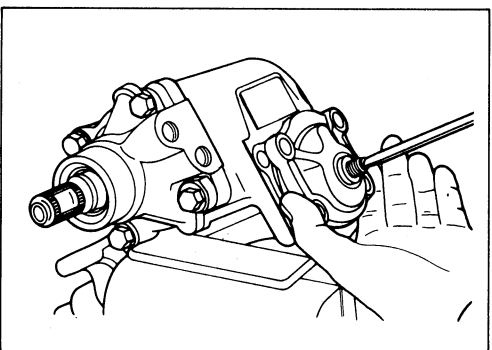


4. Oil seal

- (1) Clean the faces of the stub shaft extended outward.
- (2) Plug the hose fitting on the inlet side.
- (3) Remove the oil seal by applying compressed air through the hole in the outlet side.

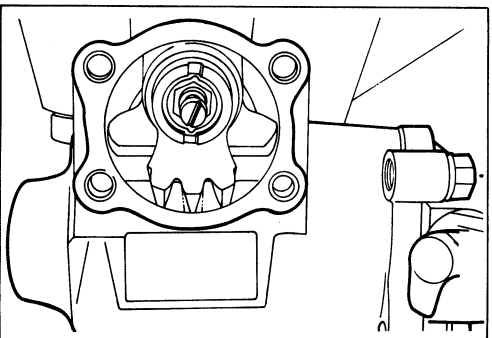
5. Lock nut

Remove the adjusting screw lock nut and turn the adjusting screw counter-clockwise to remove the preload between the sector gear and the rack piston, then remove the top cover bolts.



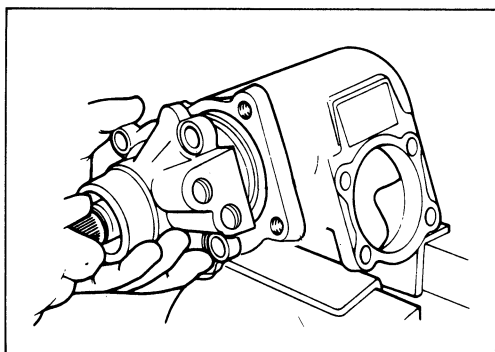
6. Top cover

Hold the top cover stationary, turn the adjust screw clockwise to raise and free the cover, then remove the cover.



9. Sector shaft

Bring the stub shaft into straight-ahead position.
Do not the sector shaft off the gear box with a hammer or other impact tools.

**10. Ball screw and valve housing assembly**

It is strongly advisable to keep the ball nut and valve housing assembly always in a horizontal position, or the rack piston will fall off onto the end of the worm, causing the rack piston to slip out of the worm shaft and the balls to fall out.



INSPECTION AND REPAIR

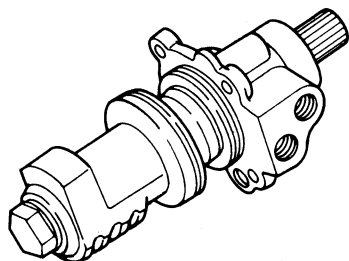
Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Bearing
- Oil seal, Dust seal, Dust cover
- O-Ring, Sealing
- Ball nut and valve housing
- Sector shaft
- Gear box



Visual check

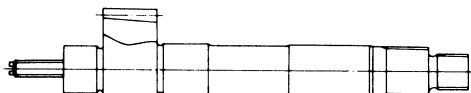
Inspect the following parts for wear, damage or other abnormal conditions.



Ball-nut rotation

Hold the ball nut and valve housing assembly vertically and see if the ball-nut lowers with turning motion smoothly. If lowering of the ball-nut with its own weight is rough, check the worm shaft for bending and ball-groove for burns, dents and presence of foreign matter.

Note: When making a test on the ball nut and valve housing assembly, take care not to strike the ball nut against the end of worm shaft, or damage to the ball tubes will result.

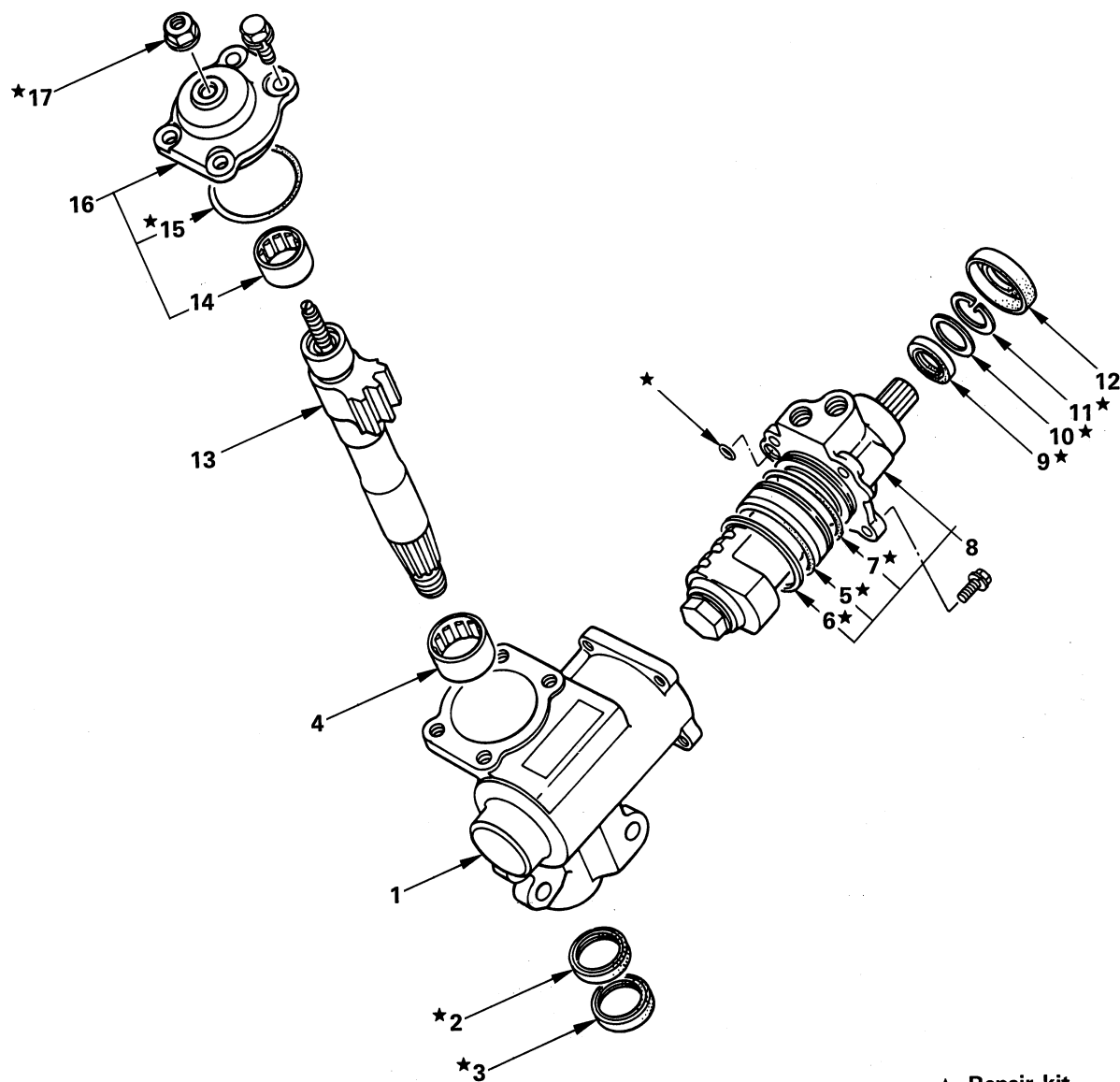


Sector shaft outside diameter

mm(in.)	
Standard	Limit
32.0 (1.260)	31.7 (1.248)



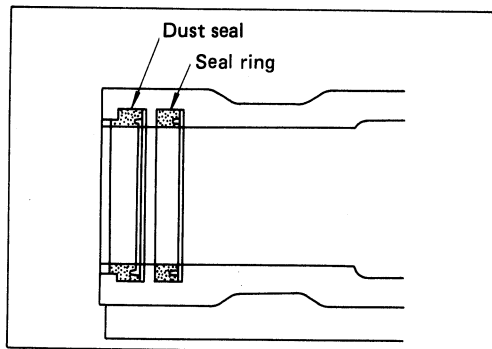
REASSEMBLY



★ Repair kit

Reassembly steps

- | | |
|--|--------------------------|
| 1. Gear box | ▲ 10. Back up ring |
| ▲ 2. Seal ring | ▲ 11. Retaining ring |
| ▲ 3. Dust seal | 12. Dust cover |
| 4. Needle bearing | ▲ 13. Sector shaft |
| ▲ 5. O-ring | 14. Needle bearing |
| ▲ 6. Seal ring | 15. O-ring |
| ▲ 7. O-ring | ▲ 16. Top cover assembly |
| ▲ 8. Ball nut and valve housing assembly | ▲ 17. Lock nut |
| ▲ 9. Oil seal | |



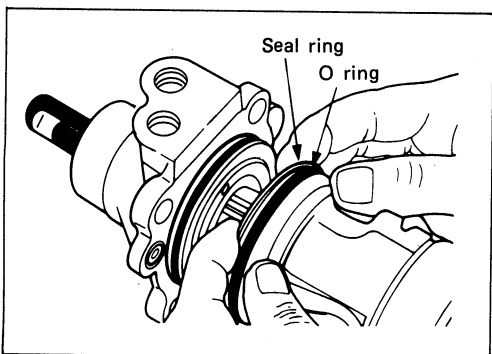
2. Seal ring

3. Dust seal



Note the setting direction.

Apply a thin coat of grease to lip of the each parts.

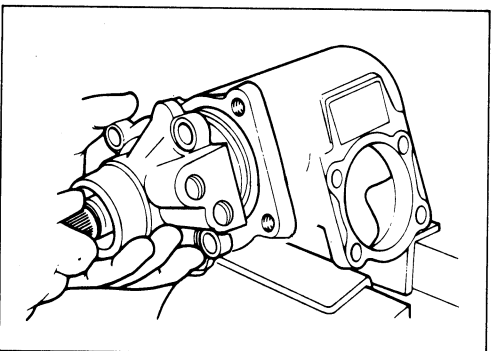


5. O-ring

6. Seal ring

7. O-ring

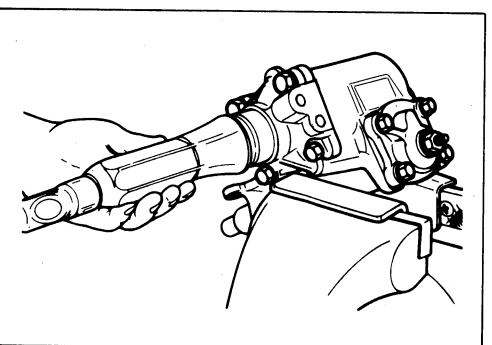
Apply a thin coat of grease.



8. Ball nut and valve housing assembly

- (1) It is strongly advisable to keep the ball screw and valve housing assembly always in a horizontal position and avoid holding it vertically, or the rack piston will fall off onto the end of the worm, causing the rack piston to slip out of the worm shaft and balls to fall out.
- (2) Be carefully so as not to drop the O-ring fitted to oil passage in the valve housing.
- (3) Tighten the valve housing retaining bolts to the specified torque.

Torque	kg-m(ft.lbs.)	3.8 - 4.2 (27 - 30)
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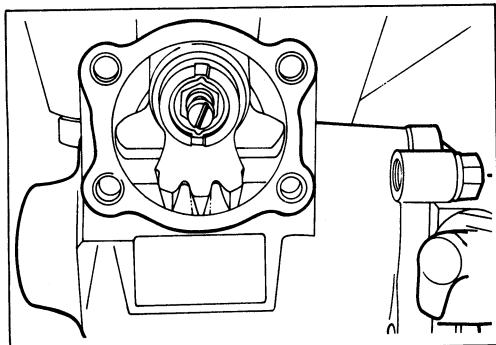


9. Oil seal

Special tool: J-26508

10. Back up ring**11. Retaining ring**

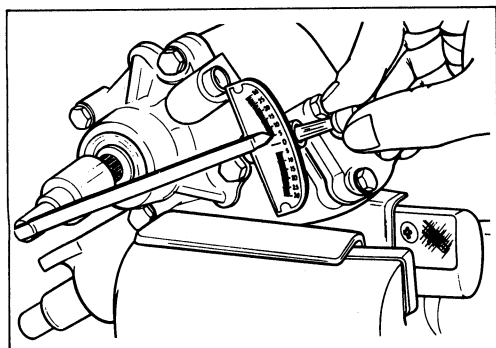
Turn the face with rounded edge (outer circumference) to the oil seal.

**13. Sector shaft**

- (1) Tape the sector shaft serration to protect the seal ring from damage.
- (2) Align the center tooth of ball nut with that of the sector shaft.

**16. Top cover assembly**

Bolt torque	kg-m(ft.lbs.)	4.0 — 5.0 (29 — 36)
-------------	---------------	---------------------

**17. Lock nut**

Adjust the backlash between the sector gear and ball-nut.

- (1) Set the sector shaft in a straight ahead position.
- (2) With the adjust screw, adjust the backlash to the specification.

Backlash (Preload)	kg-m(ft.lbs.)	0.47 — 0.77 (3.4 — 5.6)
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- (3) Lock adjust screw with lock nut.

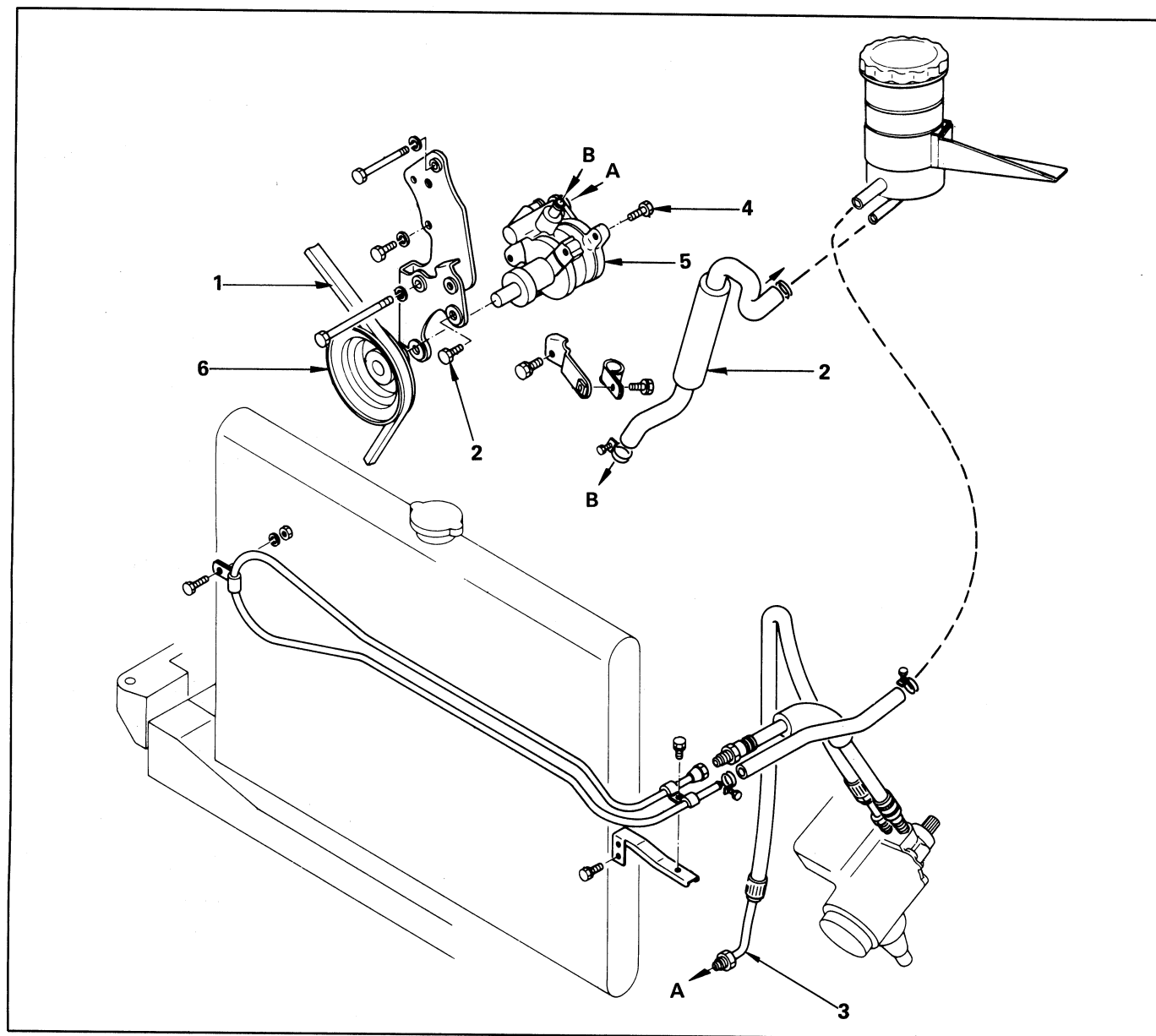


Torque	kg-m(ft.lbs.)	3.5 — 4.8 (25 — 35)
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OIL PUMP



REMOVAL AND INSTALLATION

**Removal steps**

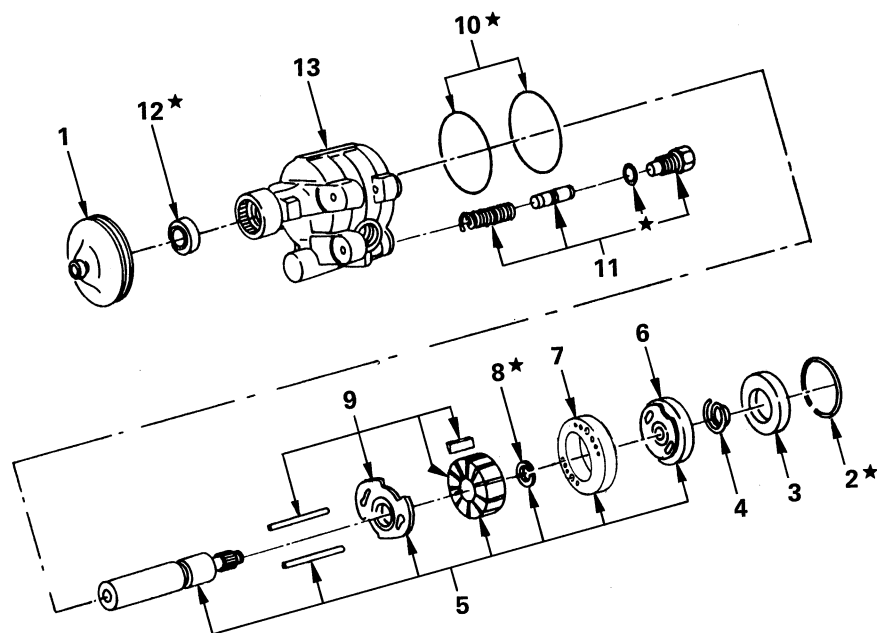
1. Belt ; oil pump
2. Hose ; rubber, suction power steering
3. Hose ; flexible
4. Bolts
5. Pump assembly ; oil
6. Pulley ; oil pump

Installation steps

To install follow the removal procedure in reverse order



DISASSEMBLY



★ Repair kit

Disassembly steps

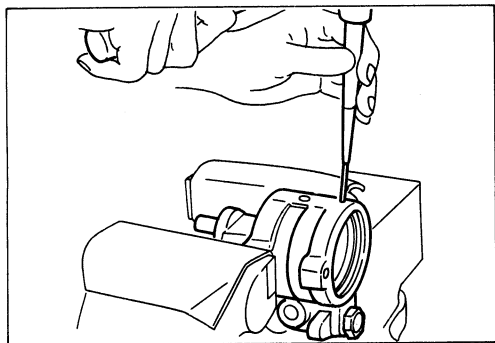
- | | |
|-------------------------------|---|
| 1. Pulley | 8. Retaining ring |
| ▲ 2. End plate retaining ring | 9. Rotor, vane, thrust plate and dowel pins |
| 3. End plate | 10. O-rings |
| 4. Pressure plate spring | 11. Control valve assembly |
| 5. Pump cartridge and shaft | 12. Oil seal |
| 6. Pressure plate | 13. Pump housing |
| 7. Cam | |



Important operation

2. End plate retaining ring

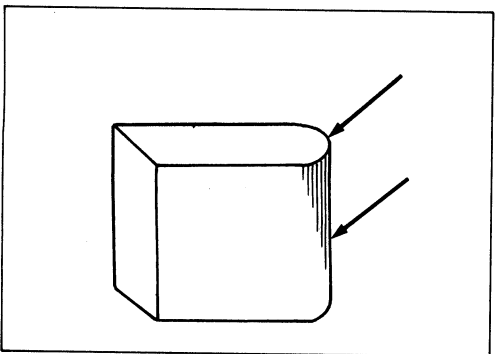
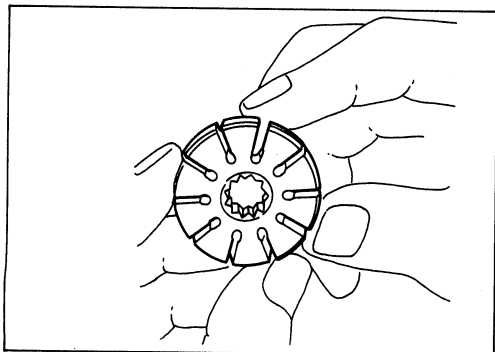
Remove the end plate retaining ring drawn in by using a drill.





INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



Rotor

Check that the groove in the vane is free from excessive wear and that the vane slides smoothly.

When part replacement becomes necessary, the pump cartridge should preferably be replaced as a sub assembly.

Vane

Sliding faces of the vane should be free from wear. (particularly the curved face at tip in contact with the cam should be free from wear and distortion).

When part replacement becomes necessary, the pump cartridge should preferably be replaced as a sub assembly.

Cam

The inner face of the cam should have a trace of uniform contact without a sign of step wear.

When part replacement becomes necessary, the pump cartridge should preferably be replaced as a sub assembly.

Pressure plate and thrust plate

The sliding faces of the parts must be free from step wear (more than 0.01 mm) which can be felt by the finger nail.

The parts with minor scores may be reused after lapping the face.

Valve

The sliding face of the valve must be free from burrs and damage.

The parts with minor scores may be reused after making correction with emery cloth (#800 or finer).

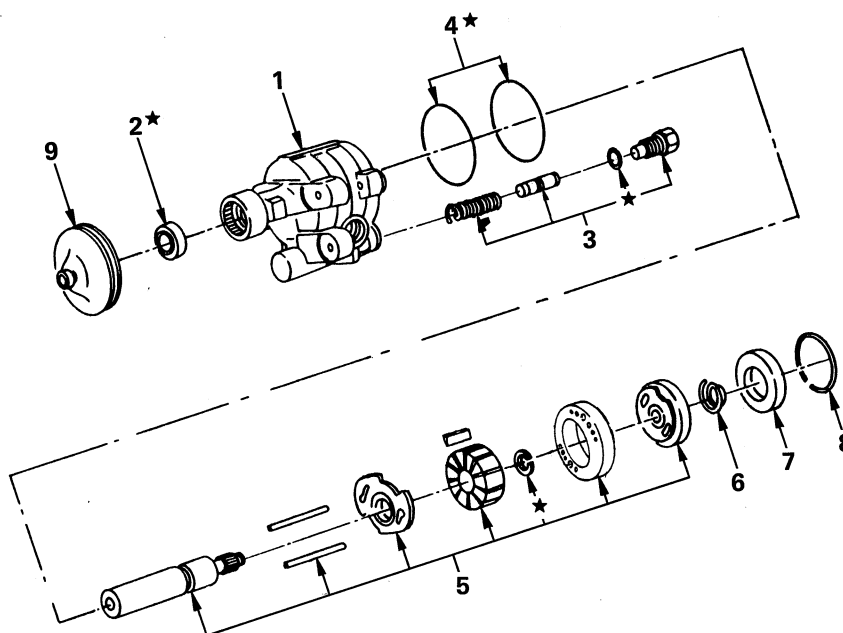
Shaft

Oil seal sliding faces must be free from a step wear which can be felt by the finger nail.

Needle bearing fitting face must be free from disintegration and wear.



REASSEMBLY



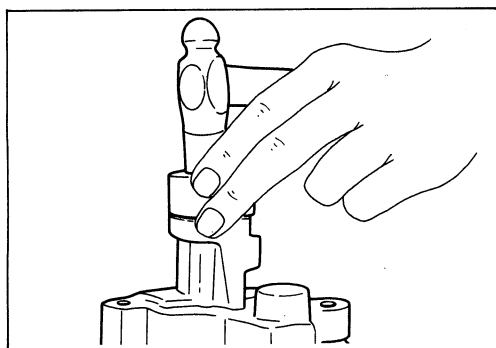
★ Repair kit

Reassembly steps

- | | |
|-------------------------------|-------------------------------|
| 1. Pump housing | 6. Pressure plate spring |
| ▲ 2. Oil seal | 7. End plate |
| 3. Control valve assembly | ▲ 8. End plate retaining ring |
| 4. O-rings | ▲ 9. Pulley |
| ▲ 5. Shaft and pump cartridge | |



Important operation

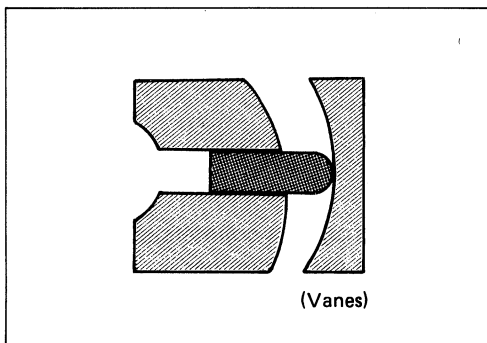


2. Oil seal

Install oil seal

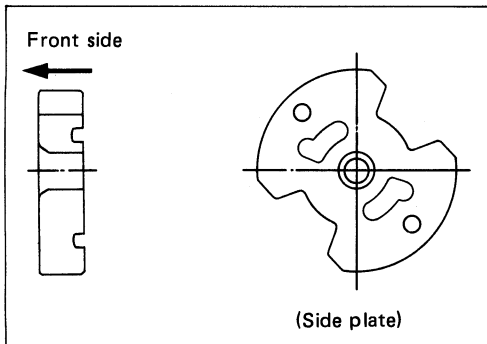
-3.

Oil seal installer : J-29755-3.

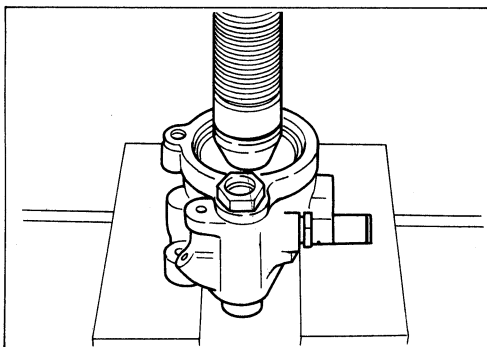


5. Shaft and cartridge

Install the vanes with curved face in contact with the inner wall of the cam.

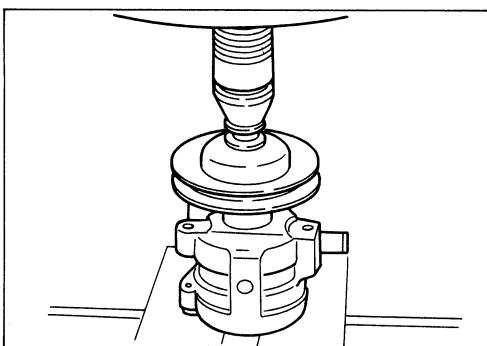


Set the side plate in correct direction.



8. End plate retaining ring

Install end plate retaining ring with spring drawn in by a press.



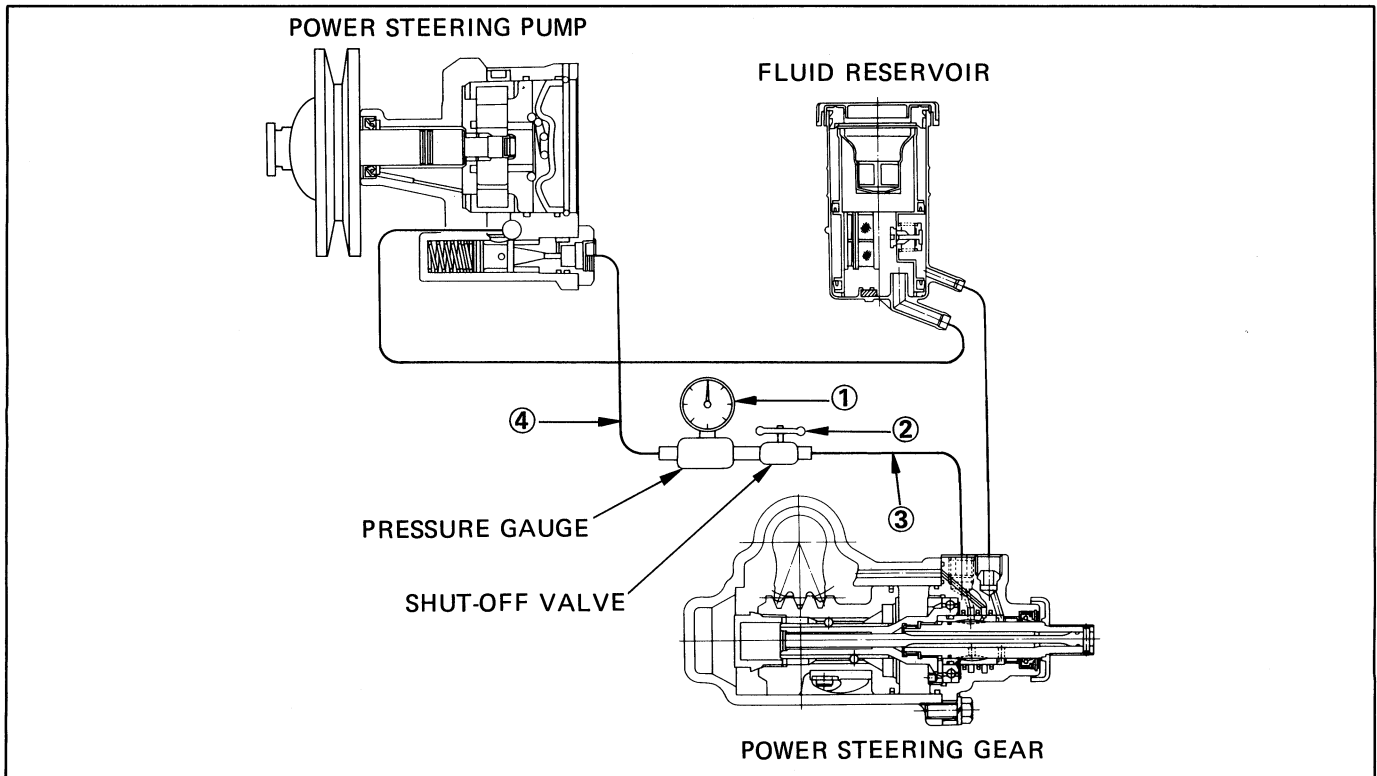
9. Pulley

Install pulley using a press.

INSPECTION OF POWER STEERING SYSTEM

MEASUREMENT OF FLUID PRESSURE

Measurement of fluid pressure in the power steering system is performed to determine whether or not the oil pump and power steering unit are functioning normally.



1. Installation of tester

- Power steering tester : J-29877-A
Adapter ; power steering tester : J-33996
- ① Oil pressure gauge with shut off valve
- ② Shut off valve
- ③ Adapter (to oil pump)
- ④ Adapter (to steering unit)

• Installation procedure ;

Disconnect the hose on the outlet side of the pump at the back of the pump. Connect the gauge hose closest to the power steering gauge shut off valve to the hose on the vehicle. Connect the gauge hose furthest from the shut off valve to the back of the power steering pump.

2. Bleeding

- Open stop valve fully.
- Fill fluid reservoir with specified automatic transmission fluid (DEXRON) and turn the steering wheel to lock in both directions repeatedly, so that level of fluid in the reservoir lowers.
- Replenish to bring level of fluid in the reservoir to the specified level and start the engine.
- Perform the following check with the engine running at idle. Bleeding is considered to be completed if the following conditions apply ;
 - (1) Turn the steering wheel to lock in both directions 3 or 4 times.
A buzz is not produced in the hydraulic line.
 - (2) Stop the engine with steering wheel in a straight-ahead position.
Level of fluid in reservoir does not increase.

Note: Do not hold the steering wheel in position of lock for more than 5 seconds, or temperature of fluid increases sharply.

**3. Measurement of fluid pressure**

- Open stop valve fully.
- Increase engine speed to 1500 rpm.
- Measure the fluid pressure when the steering wheel is turned to lock in both directions.

Fluid pressure	kg-cm ² (psi)	77 — 85 (1,085 — 1,210)
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Judgement :

- (1) When pressure is higher than 85 kg/cm² (1,210 psi)
Valve within oil pump defective
 - (2) When pressure is lower than 77 kg/cm² (1,085 psi)
- Return steering wheel to straight-ahead position.
 - Close stop valve completely.
 - Hold engine running at 1500 rpm,
and take reading of the pressure gauge.

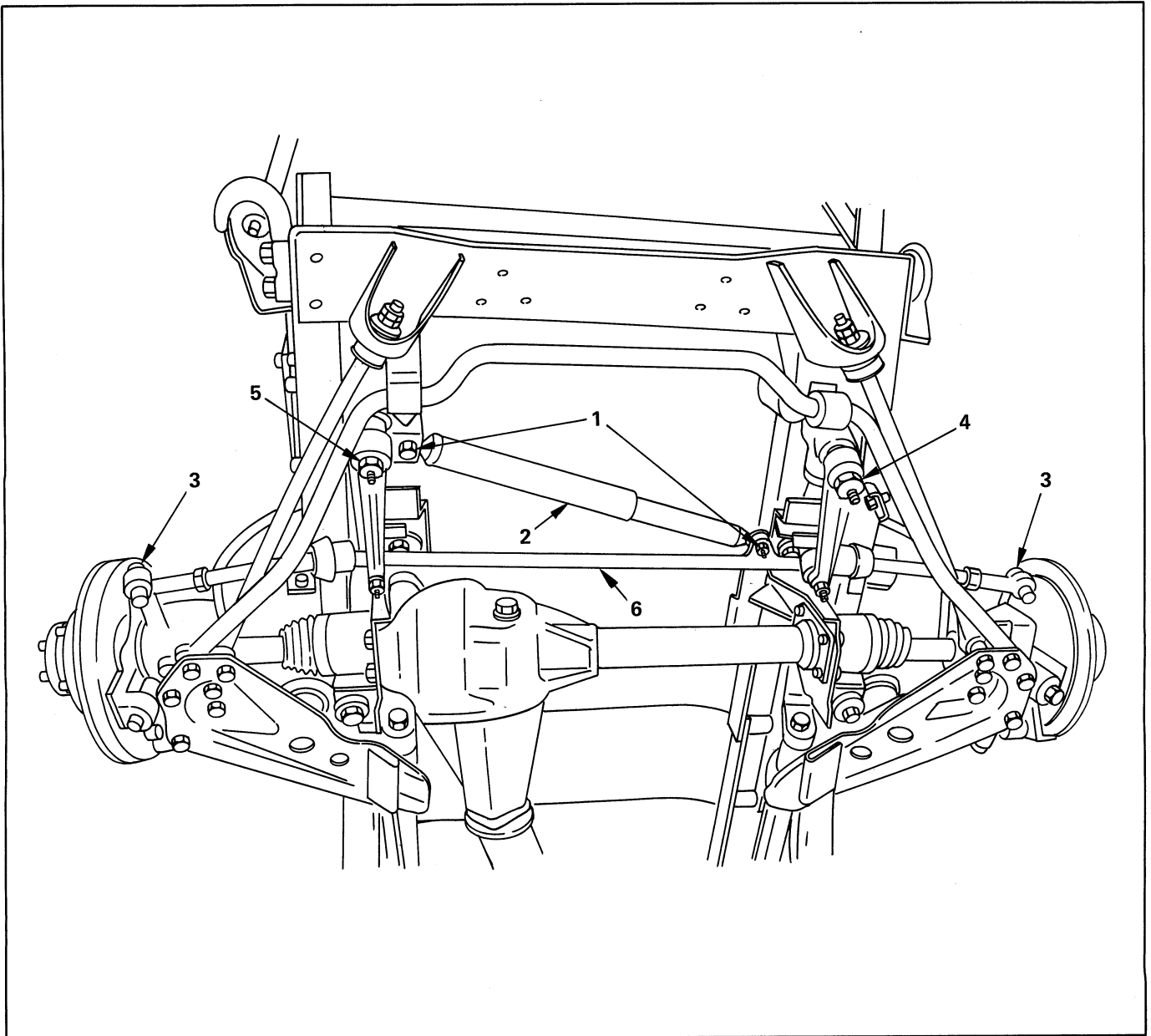
Judgement :

kg/cm ² (psi)	
Fluid pressure	Possible trouble
77 — 85 (1.085 — 1,210)	Steering unit
Lower than 77 (1,085)	Oil pump

STEERING LINKAGE



REMOVAL AND INSTALLATION



Removal steps

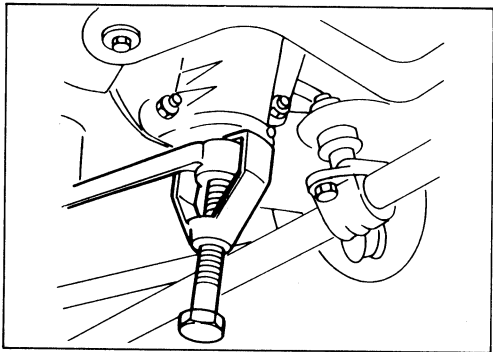
1. Nuts and bolts
2. Steering damper (Manual steering model only)
3. Nut
4. Nut ; pitman arm
5. Nut ; relay lever
- ▲ 6. Intermediate rod

Installation steps

6. Intermediate rod
- ▲ 5. Nut ; relay lever
- ▲ 4. Nut ; pitman arm
3. Nut
2. Steering damper (Manual steering model only)
- ▲ 1. Nuts and bolts

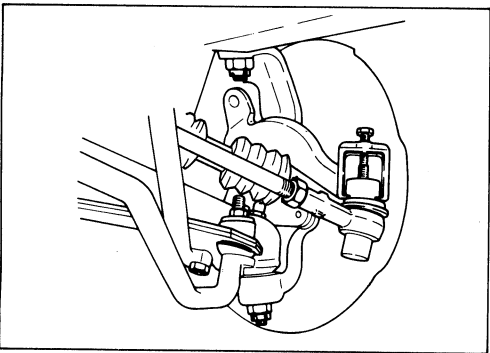


Important operations — removal



6. Linkage assembly

Pitman arm and relay lever remover : J-29107



Tie rod remover : J-21687-02



Important operations — Installation



5. Nut ; relay lever

Torque	kg-m(ft.lbs.)	11 — 13 (80 — 94)
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4. Nut ; pitman arm

Torque	kg-m(ft.lbs.)	20 — 24 (145 — 174)
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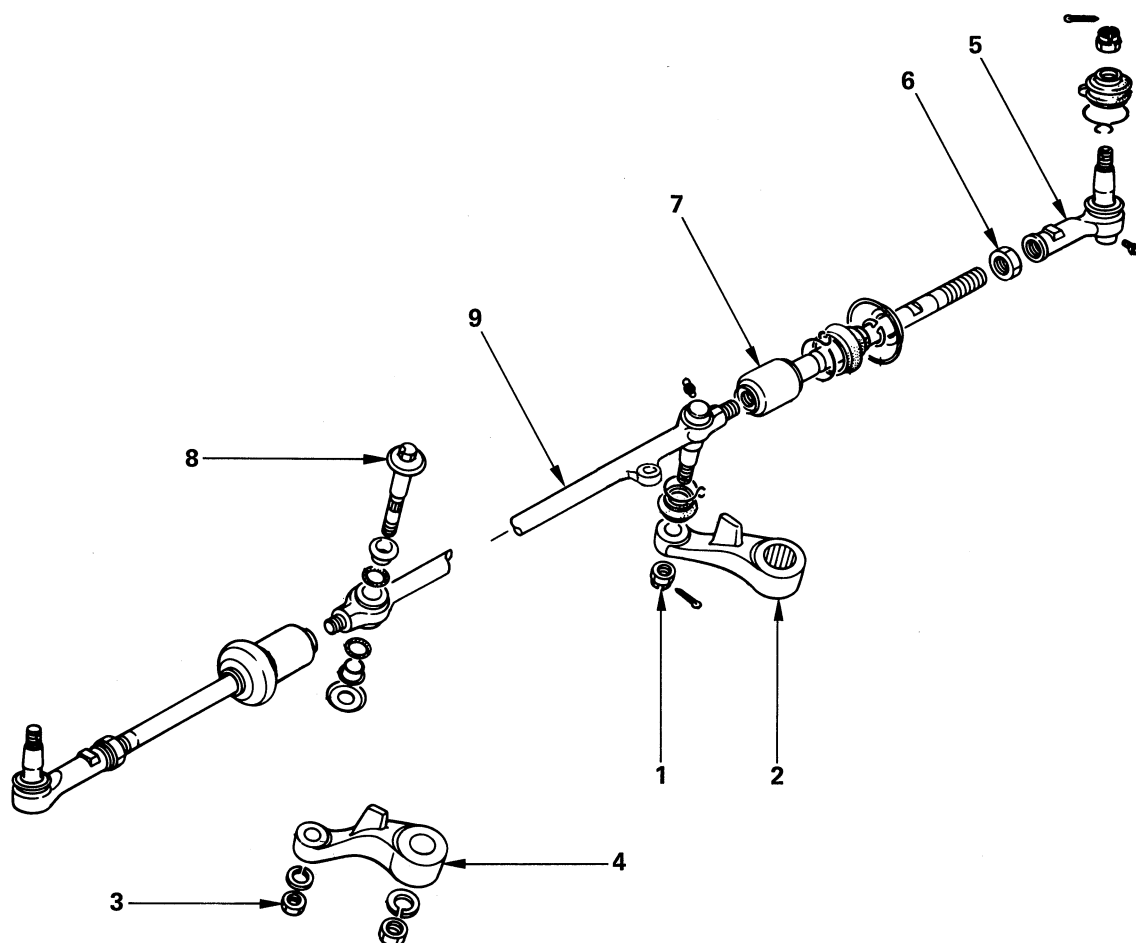


1. Nuts and bolts

Torque	kg-m(ft.lbs.)	5.5 — 6.5 (39 — 47)
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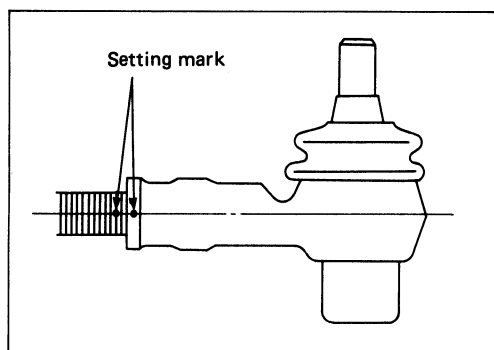
DISASSEMBLY

**Disassembly steps**

- | | |
|---------------------------|------------------------------|
| 1. Nut | 6. Nut |
| 2. Pitman arm | ▲ 7. End assembly (inner) |
| 3. Nut | 8. Pin assembly |
| 4. Relay lever | 9. Center track rod assembly |
| ▲ 5. End assembly (outer) | |

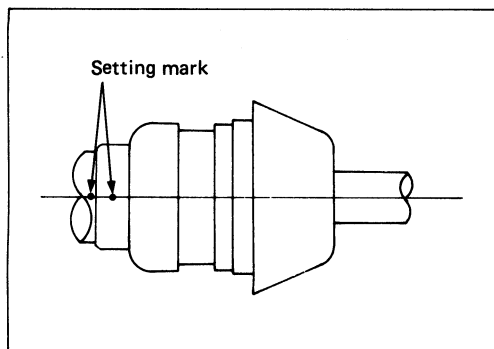


Important operations



5. End assembly (outer)

Apply the setting mark to reassemble the parts in their original position.



7. End assembly (inner)

Apply the setting mark to reassemble of the parts in their original position.



INSPECTION AND REPAIR

Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

- Pitman arm, relay lever
- End assembly, pin assembly
- Center track rod assembly
- Cover, boot

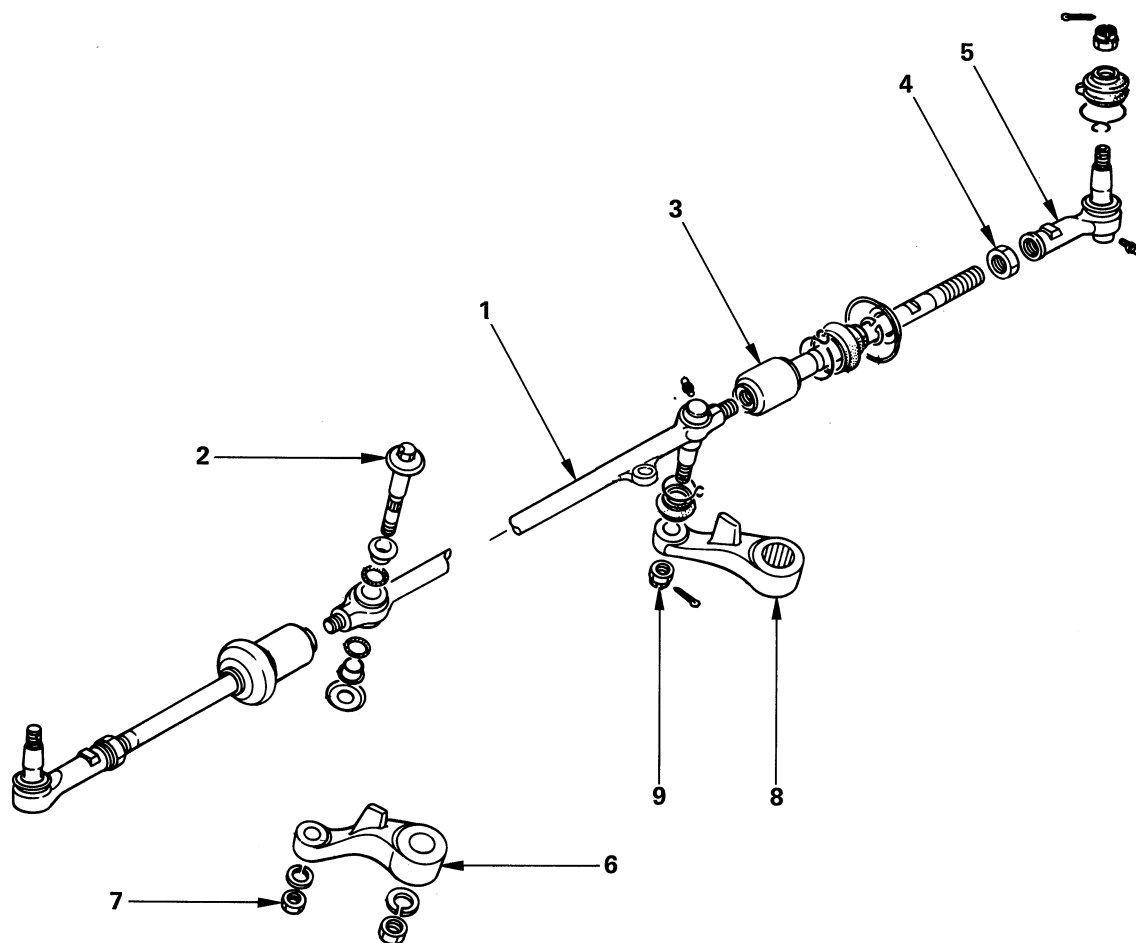


Visual check

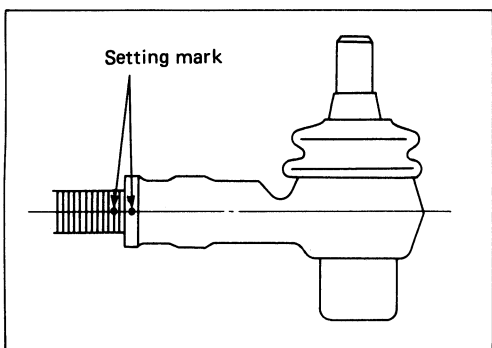
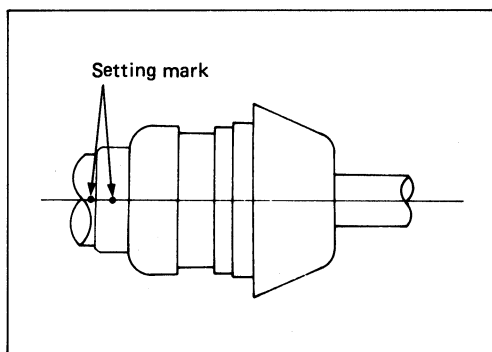
Inspect the following parts for wear, damage or other abnormal conditions.



REASSEMBLY

**Reassembly steps**

- | | |
|------------------------------|----------------|
| 1. Center track rod assembly | 6. Relay lever |
| 2. Pin assembly | ▲ 7. Nut |
| ▲ 3. End assembly (inner) | 8. Pitman arm |
| ▲ 4. Nut | ▲ 9. Nut |
| ▲ 5. End assembly (outer) | |

**Important operations****3. End assembly (inner)**

Align the setting marks applied at the disassembly.



Torque	kg-m(ft.lbs.)	8 — 10 (58 — 72)
--------	---------------	------------------

After tightening, caulk the two portions securely.

**4. Nut**

Torque	kg-m(ft.lbs.)	11 — 13 (80 — 94)
--------	---------------	-------------------

**5. End assembly (outer)**

Align the setting marks applied during disassembly.

**7. Nut**

Torque	kg-m(ft.lbs.)	6.5 — 7.5 (47 — 54)
--------	---------------	---------------------

**9. Nut**

Torque	kg-m(ft.lbs.)	5.5 — 6.5 (40 — 47)
--------	---------------	---------------------

ADJUSTMENT

Refer to Section 00
"General information"
Servicing for toe-in angle
adjustment procedure



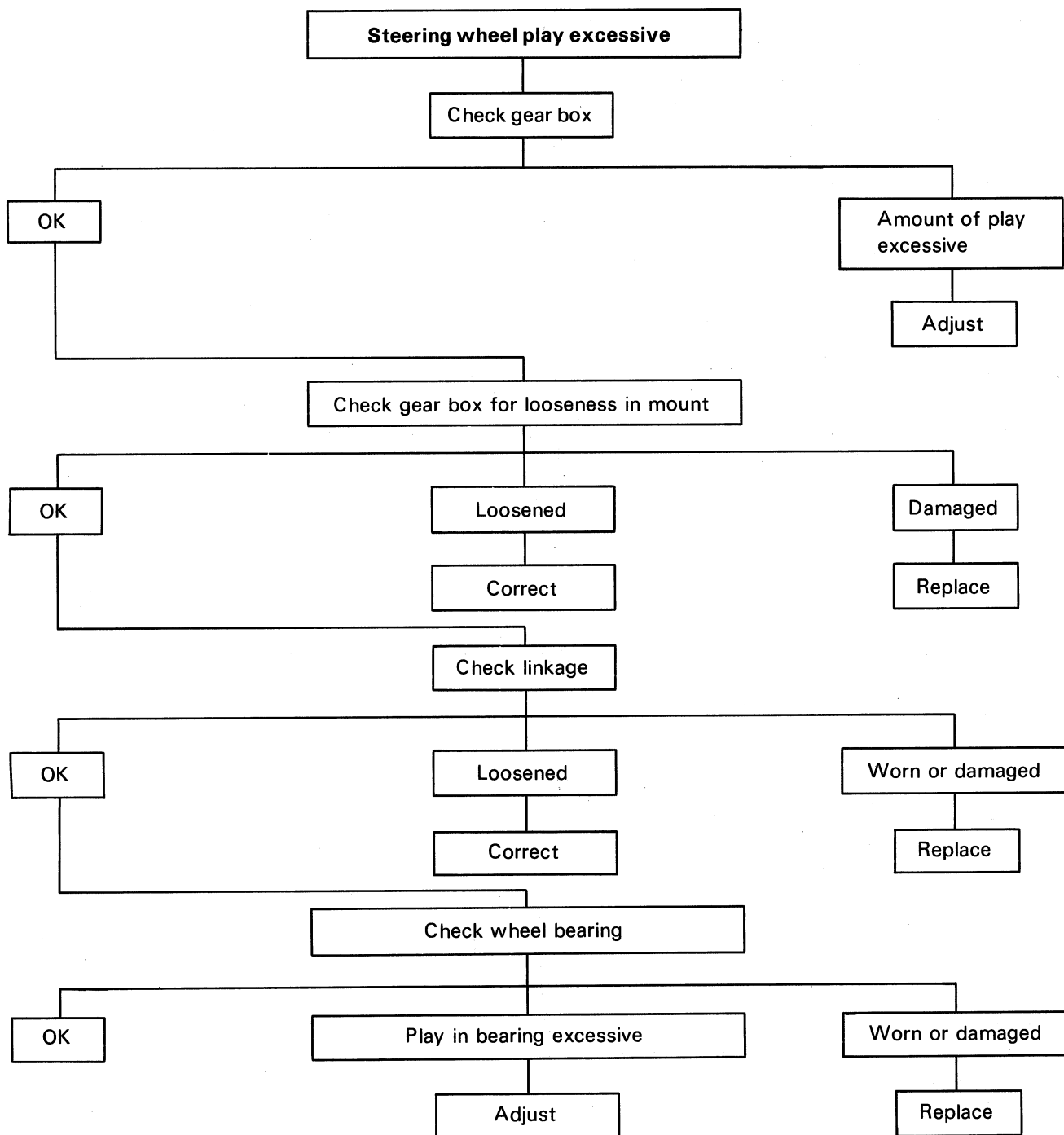
Adjust the toe-in angle, loosen the lock nut on the outer track rod and turn the track rod.

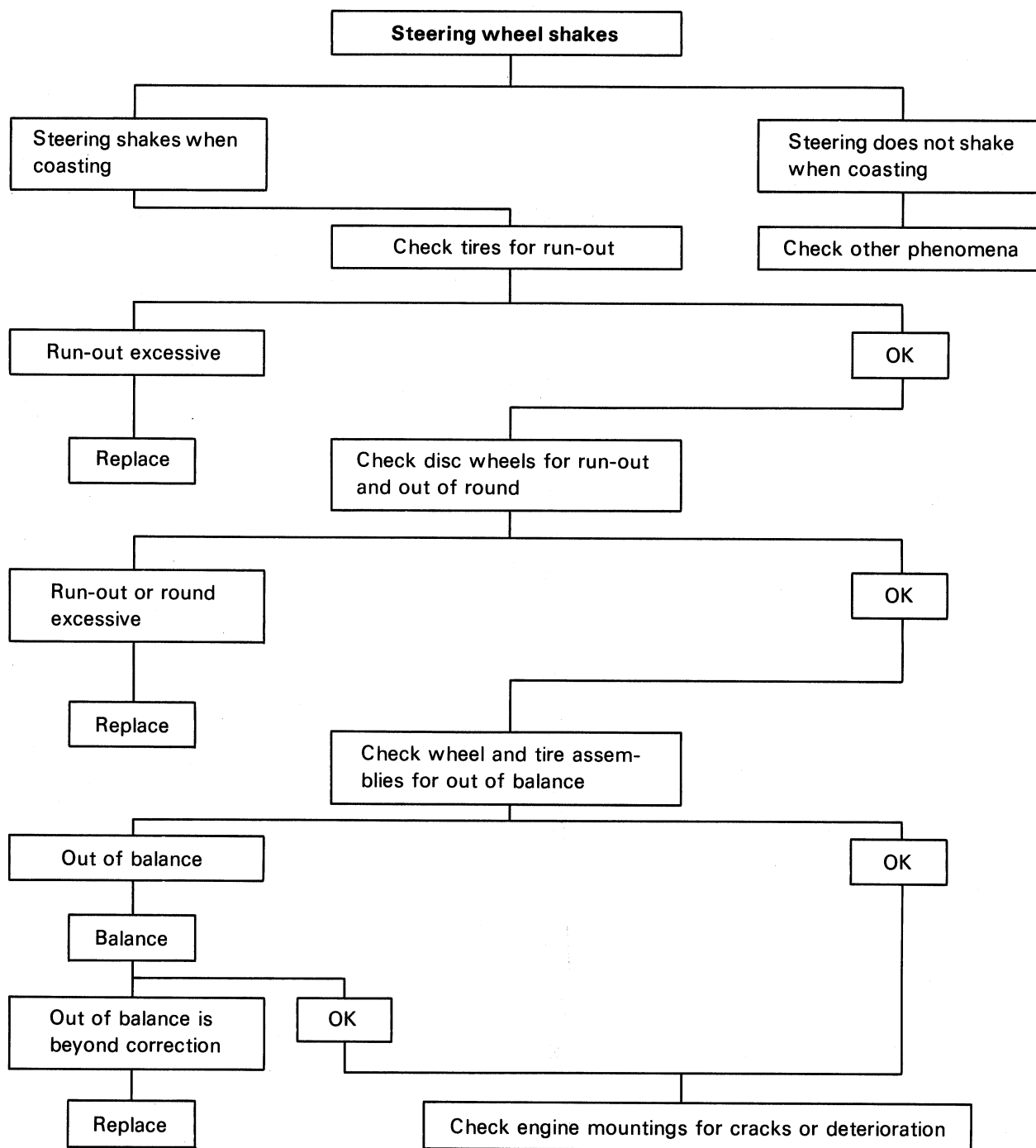
DIAGNOSIS

INSPECTION PROCEDURES FOR STEERING SYSTEM

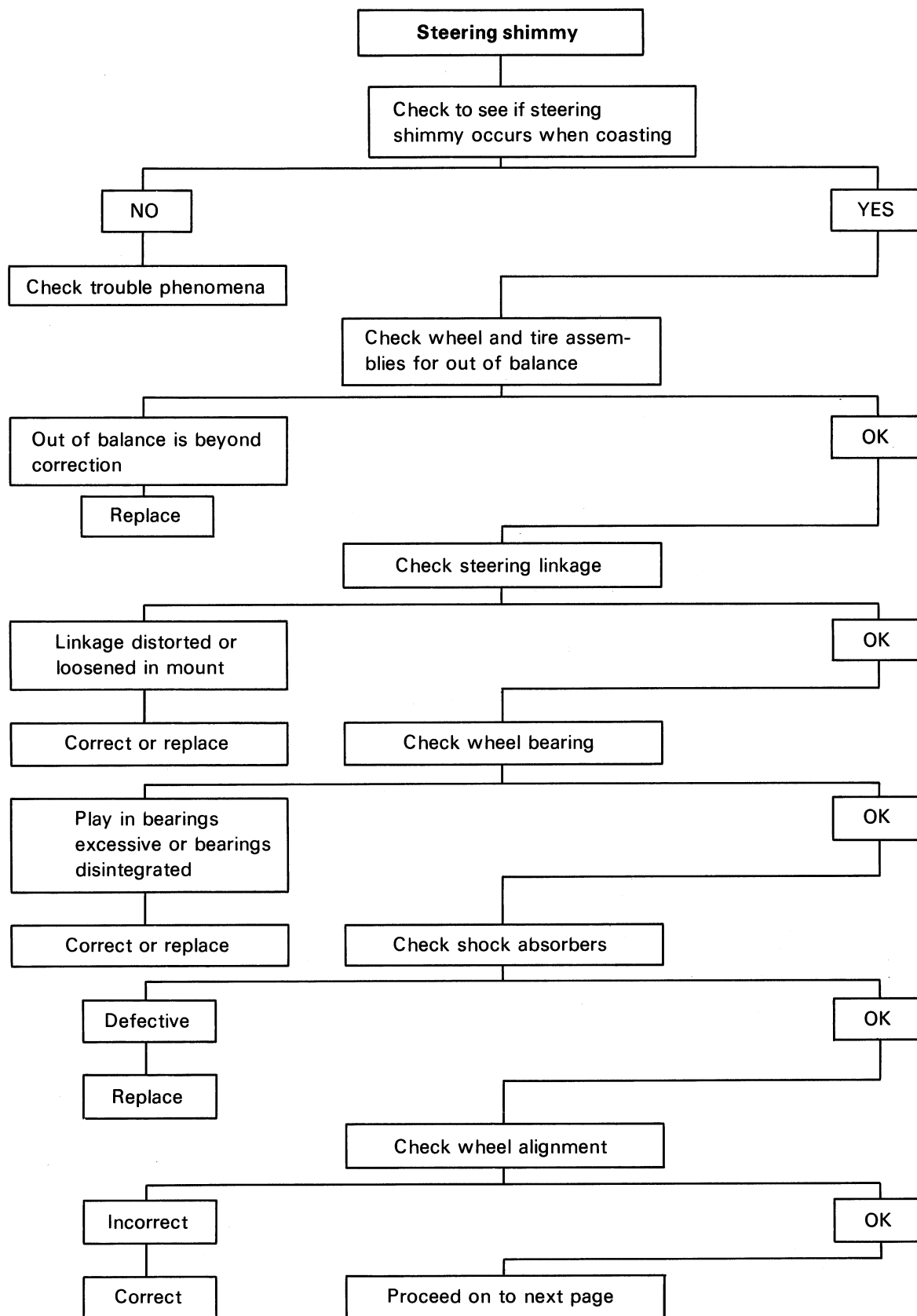
COMPONENT AND TEST		PROCEDURE
HANDLE	Check for play and slack	1. Place the steering wheel in the straight forward position. Gently move the wheel to the right and to the left. About ten millimeters of play in either direction should be present before the front tires begin to move. If the vehicle is equipped with power steering, the engine should be running when these tests are made. 2. Grasp the steering wheel firmly with both hands. Exert force in an up and down direction on the steering column. There should be no looseness. 3. Move the steering wheel to the right and to the left. Check to see that there or the steering shaft. Make sure that there is no slack in those areas where parts are joined together.
	Check the operating condition of the system	1. Make the following checks while actually driving the vehicle. a. Check the position of the steering wheel when the vehicle is traveling straight ahead. b. Make sure that the vehicle does not have a tendency to steer to the right or the left. c. There should be no excessive vibration present at the steering wheel. d. Turn the vehicle as sharply as possible to both the right and the left. When the steering wheel is turned fully in either direction, check for abnormal noise. Neither should the wheel feel overly heavy when it is fully turned to either the left or the right. Loosen your grip on the steering wheel. It should return to its center position.
GEAR BOX	Check for oil leakage	1. Check all parts of the steering unit (the oil seals of the front cover, side cover, sector shaft, etc.) to make sure that there is no oil leakage.
	Check for looseness in the assembly	1. With the wheels of the vehicle on the ground (the vehicle should not be jacked up), have an assistant or helper turn the steering wheel to the right and to the left. As he does this, you should carefully check all areas where the steering unit is attached to the frame for looseness and other possible problems.
	Check for bearing backlash	1. Check the fcondition of the connections between the steering shaft and the bearigs. Move the steering shaft in the direction of the axle and make sure that there is no backlash present. 2. Rotate the steering shaft. There should be no abnormal noise. It should rotate smoothly and there should be no feeling of roughness. Check to make sure that there is no abnormal or excessive bearing wear.
	Check for gear backlash	1. The front wheels should be facing straight ahead. Have an assistant or helper grasp the drop arm so as to immobilize it. Now try to turn the steering wheel. Backlash should not exceed one millimeter.
	Inspect the sector shaft for cracks	1. Remove the steering unit from the vehicle and break it down into its component parts. Carefully inspect the sector shaft for cracks or other damage.

COMPONENT AND TEST		PROCEDURE
RODS AND ARMS	Check for looseness, backlash, and damage	1. With the wheels of the vehicle on the ground (the vehicle should not be jacked up), have an assistant or helper turn the steering wheel to the right and to the left. As he does this, you should carefully check the connecting points of all the parts for looseness, slack, or damage. a. Specifically check the droparms, the drag rings, the tie rods, the tie rod ends, the knuckle arms, and the tie rod arms. 2. Carefully check all of the pins for cracks and other damage. 3. Make sure that the rod end boots and related areas are not cracked or otherwise damaged.
	Check the coupling parts for abrasion and other abnormal conditions	1. The ball joints and the rubber bushings should be free from abrasion or any other damage. 2. Pay careful attention to the coupling areas. Make sure that everything is properly connected.
	Check for cracks in the knuckle arms and also for poor knuckle attachment	1. Make sure that both the knuckle arms and the tie rod arms are free from cracks. The fit between the knuckles and the tapers should be secure. Look for any abnormal coloring which may indicate trouble.
KNUCKLES	Check for loose and damaged joints	1. Jack up the front axle and the front crosspiece. By hand, rotate the two front tires in either direction. Check that the king pins and the ball joints are free of looseness or slack. If looseness or slack is present, have an assistant or helper, hold down the brake pedal. Using a dial gauge, once again check the disc wheels for looseness and vibration. It is possible that the problem lies not with the steering system but with the wheel bearings.
	Check the gap between the steering knuckles and the front axle	1. Use a thickness gauge or other appropriate tool to measure the width of the gap between the steering knuckles and the front axle. Measure in the direction of the king pin. After measurement, thrust washers may be inserted to alter the gap.

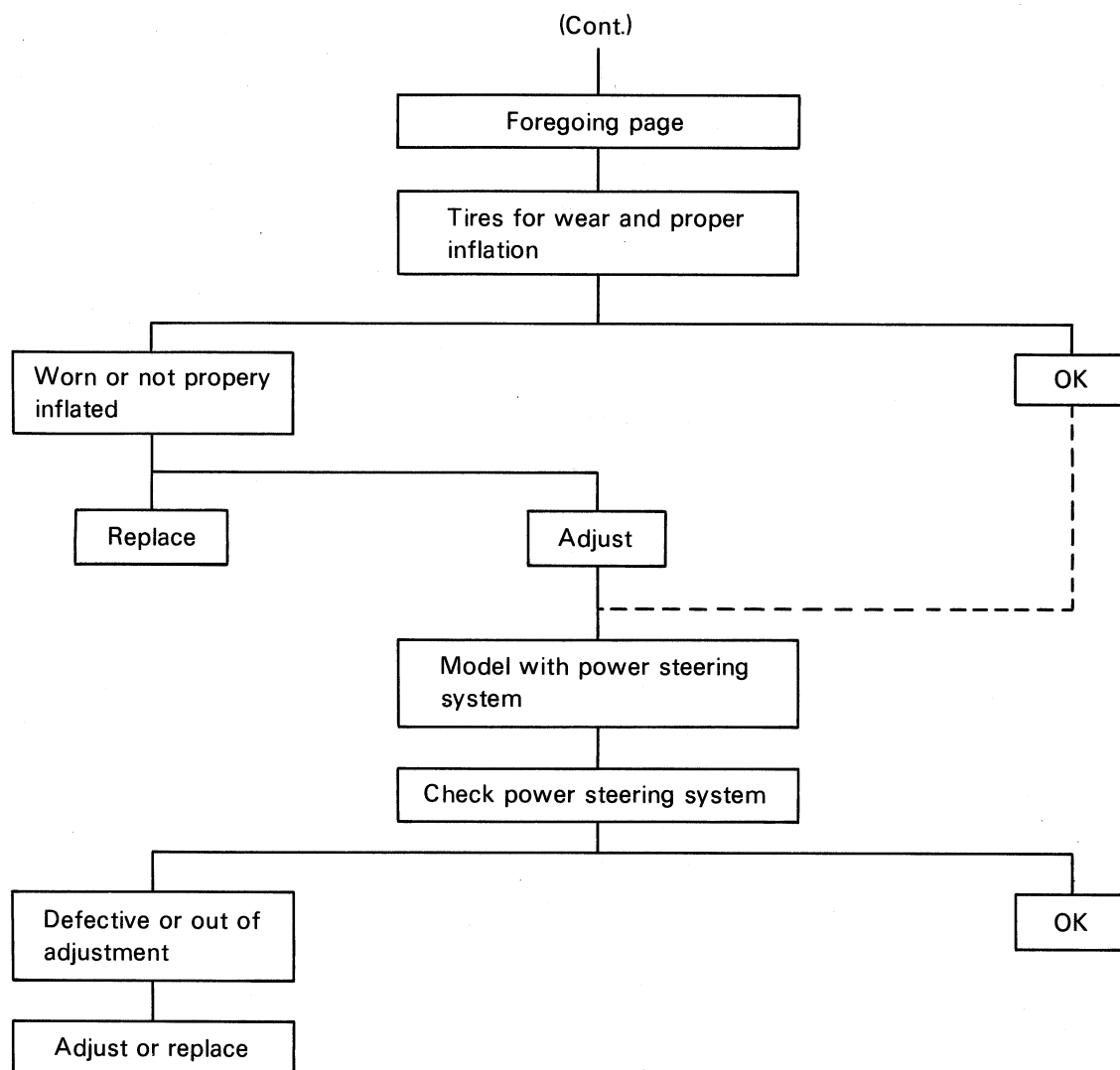




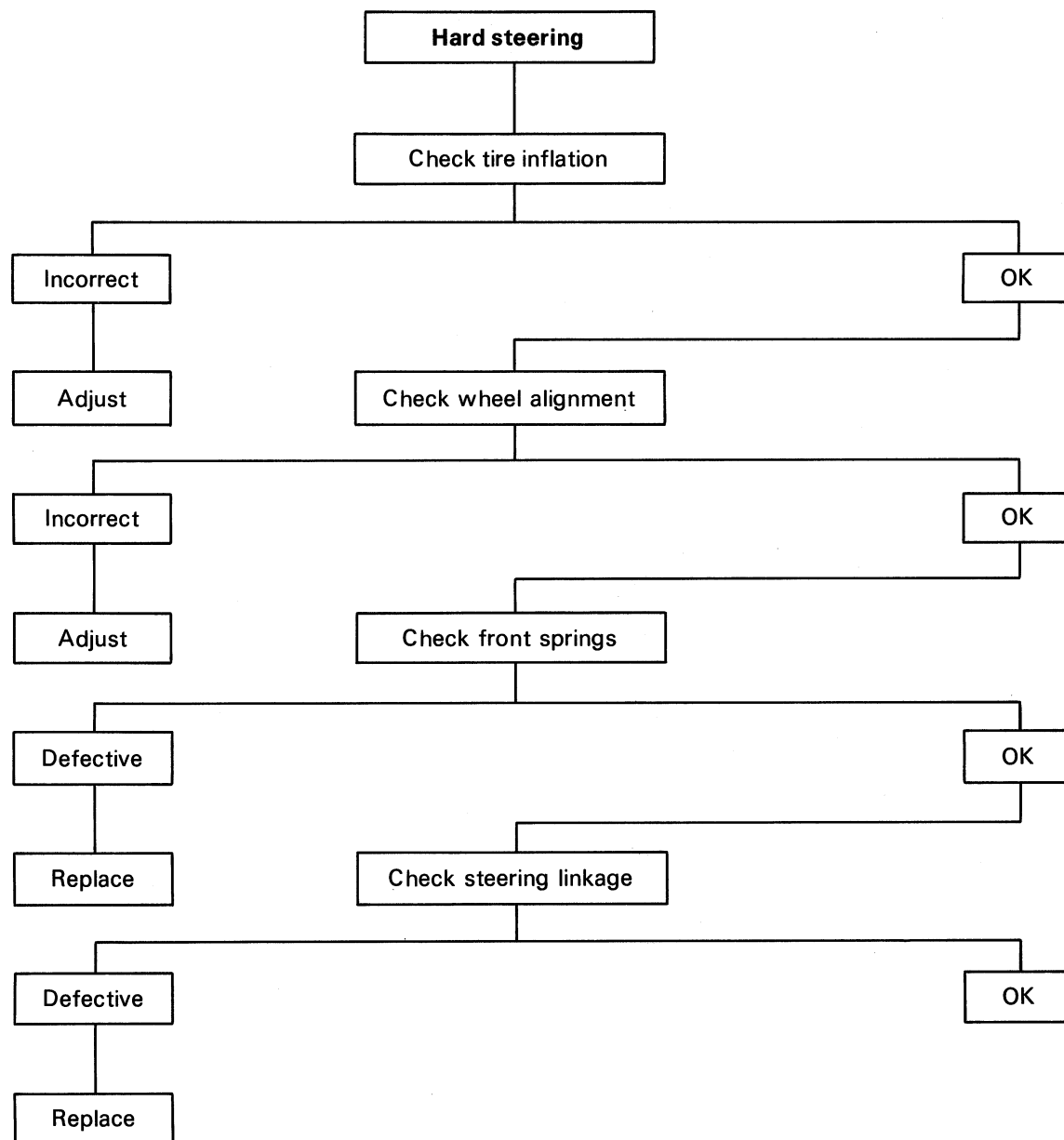
- Notice:**
1. In most case, steering shaking can be eliminated by checking and correcting wheel and tire assemblies. Wheel and tire runout requires careful adjustment.
 2. Steering shimmy and clutch shudder at starting of the vehicle should not be mistaken for steering shaking.
 3. Steering shaking is liable to occur when driving at high speed.
 4. If steering shaking occurs at a speed range of from 40 to 60 km/h, the trouble is mostly due to tire runout or use of tires that have different tread patterns.

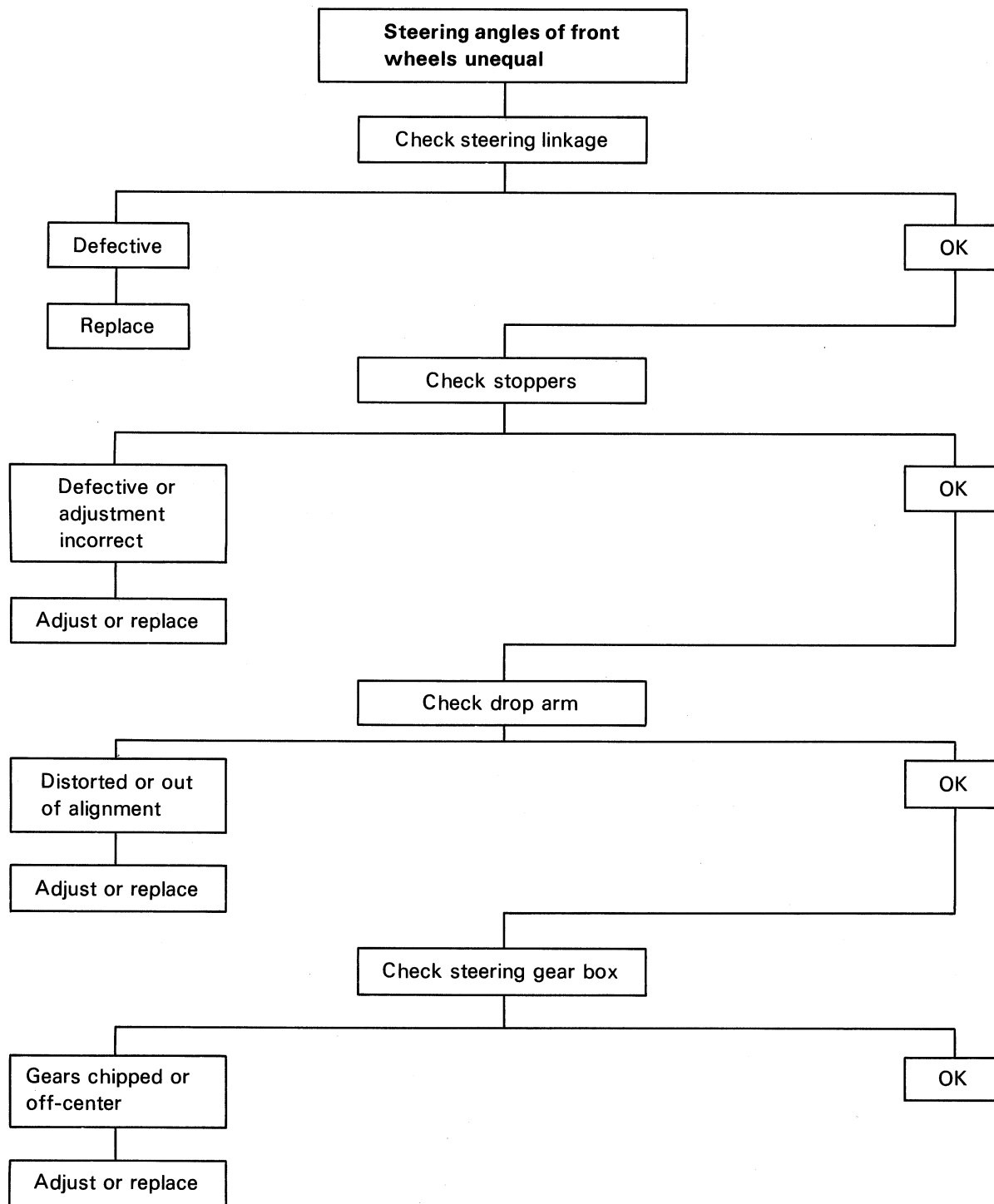


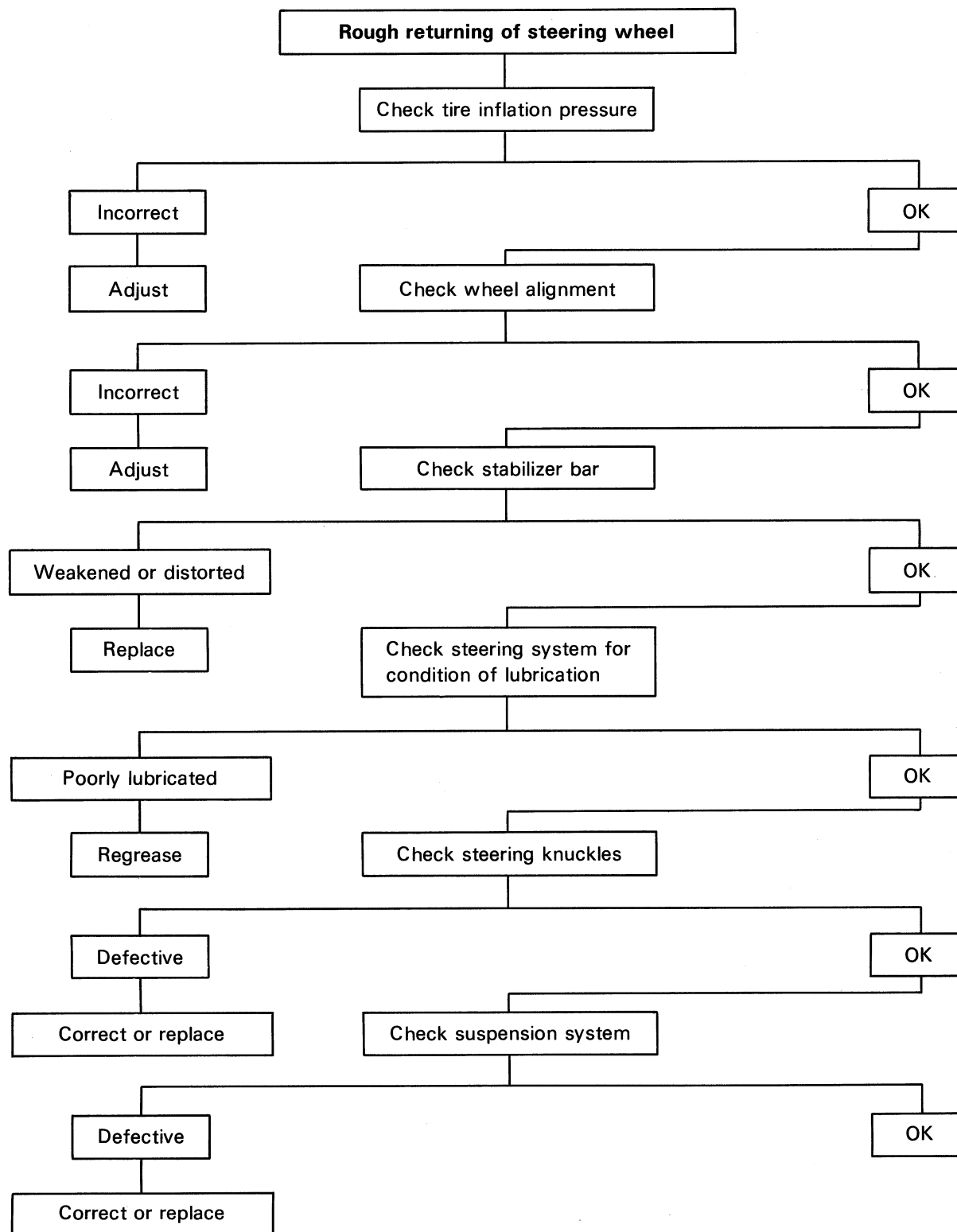
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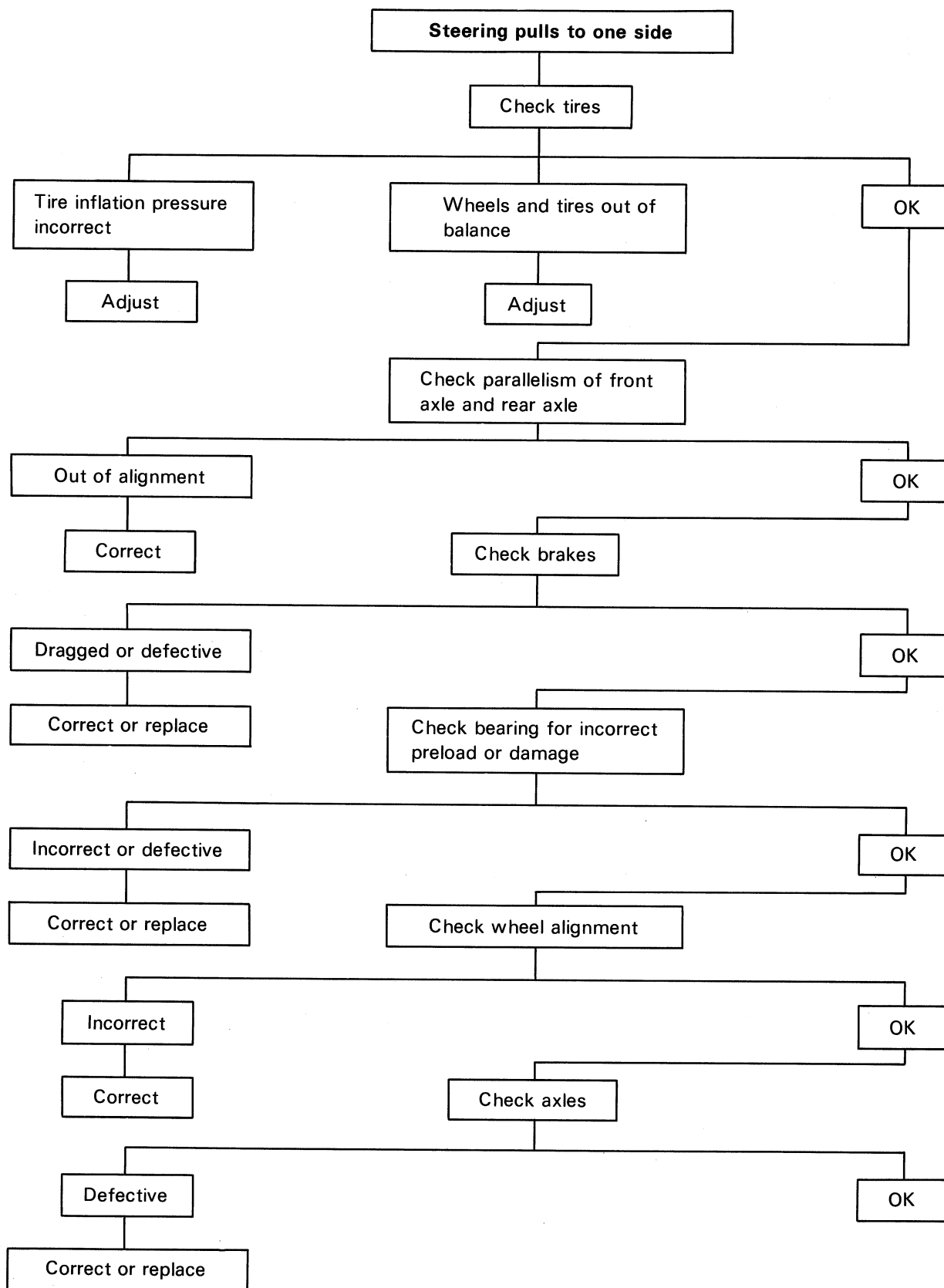


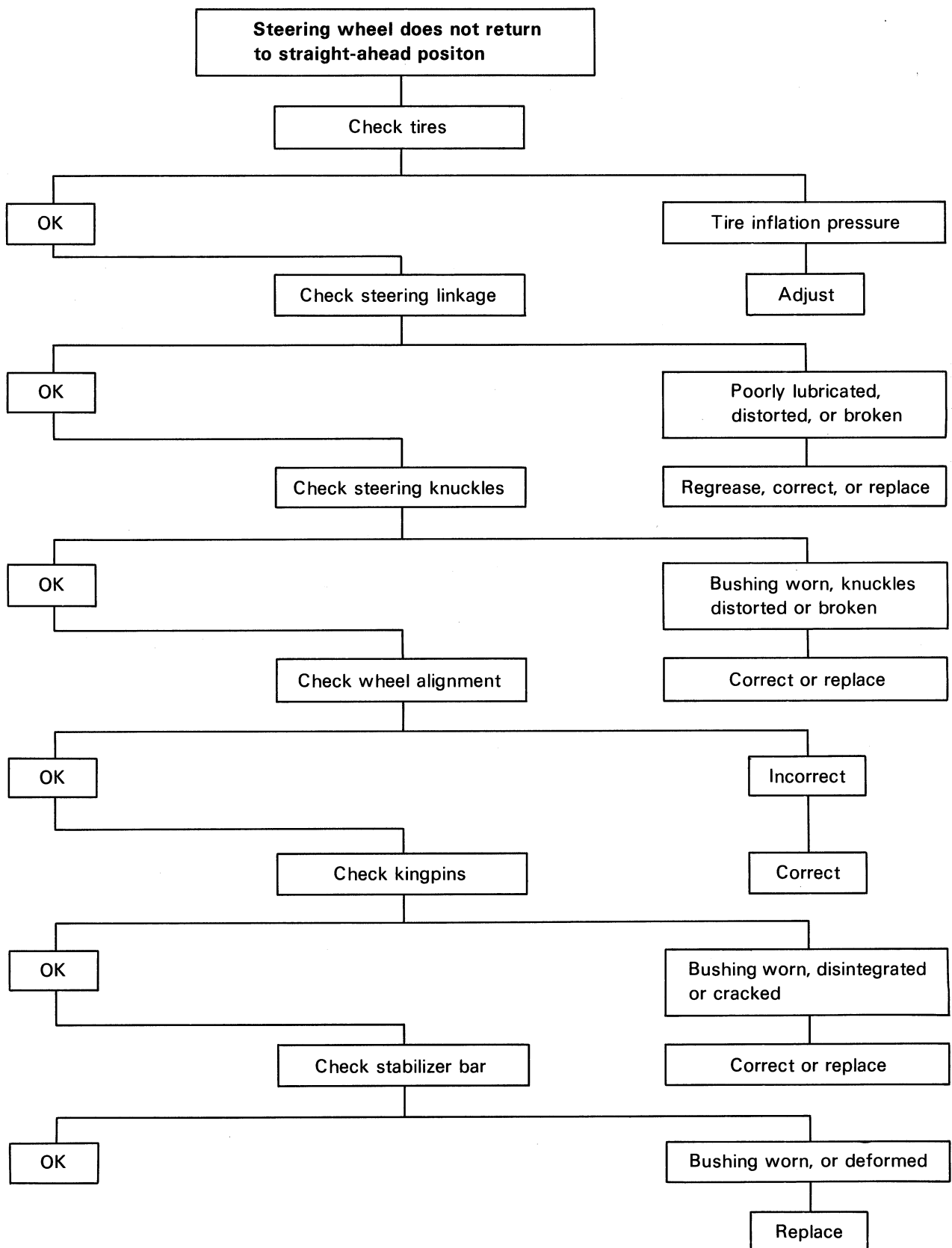
- Notice:**
1. So-called "Steering shimmy" can be eliminated through balancing of wheel and tire assemblies. The following troubles are suspected if the cause of steering shimmy can not be removed through correction of run-out and out of balance:
 - (1) Wheels are still running out or out of balance.
 - (2) Play in joints or linkage excessive, wheel alignment incorrect or linkage lacks rigidity.
 2. The steering shimmy is also related with designs of the steering linkage, suspension system, etc. which may not be correctable in some cases.
 3. The following are often mistaken for steering shimmy:
 - (1) Steering shaking
 - (2) Booming noise at low speed accompanying vibrations.
 - (3) Harshness



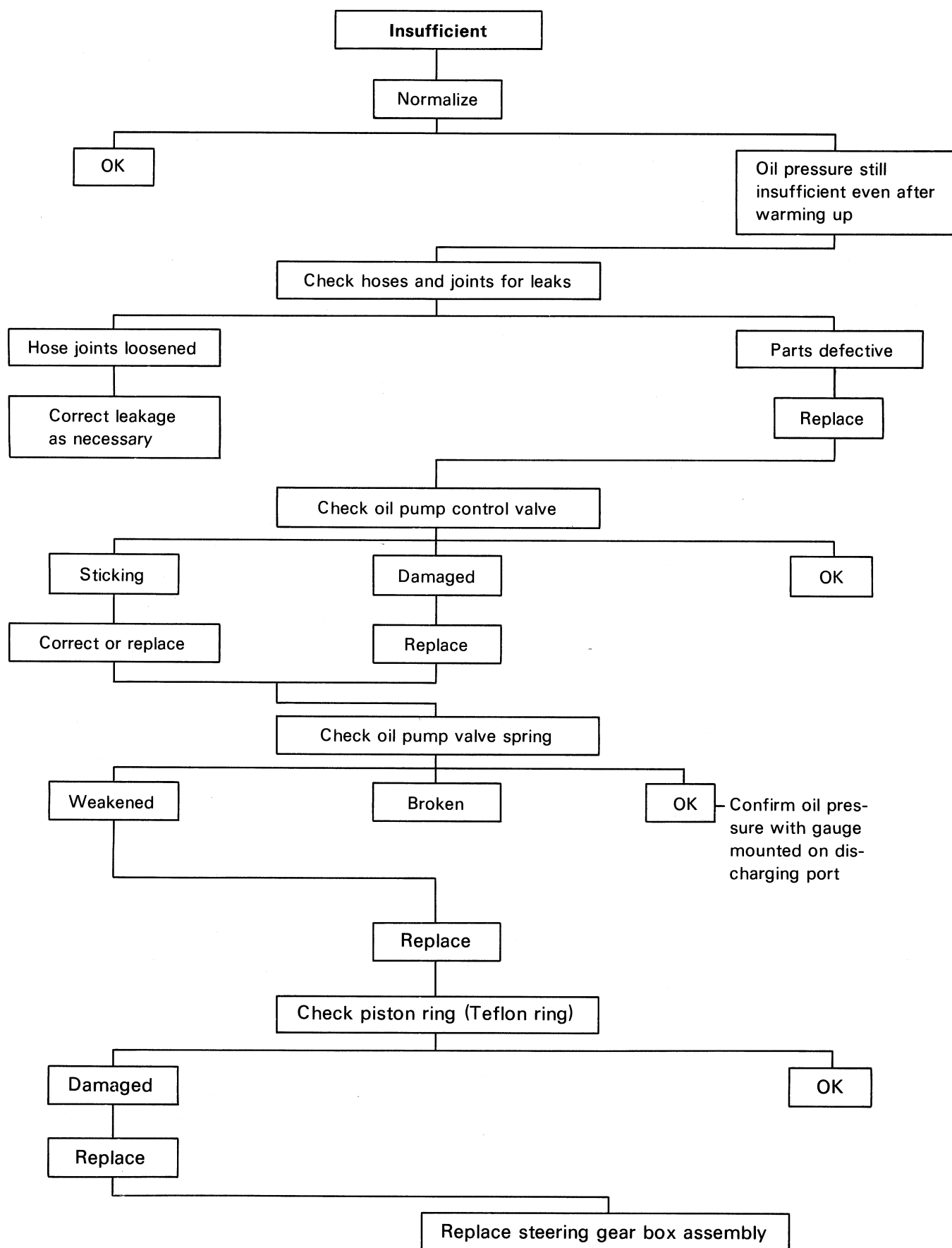


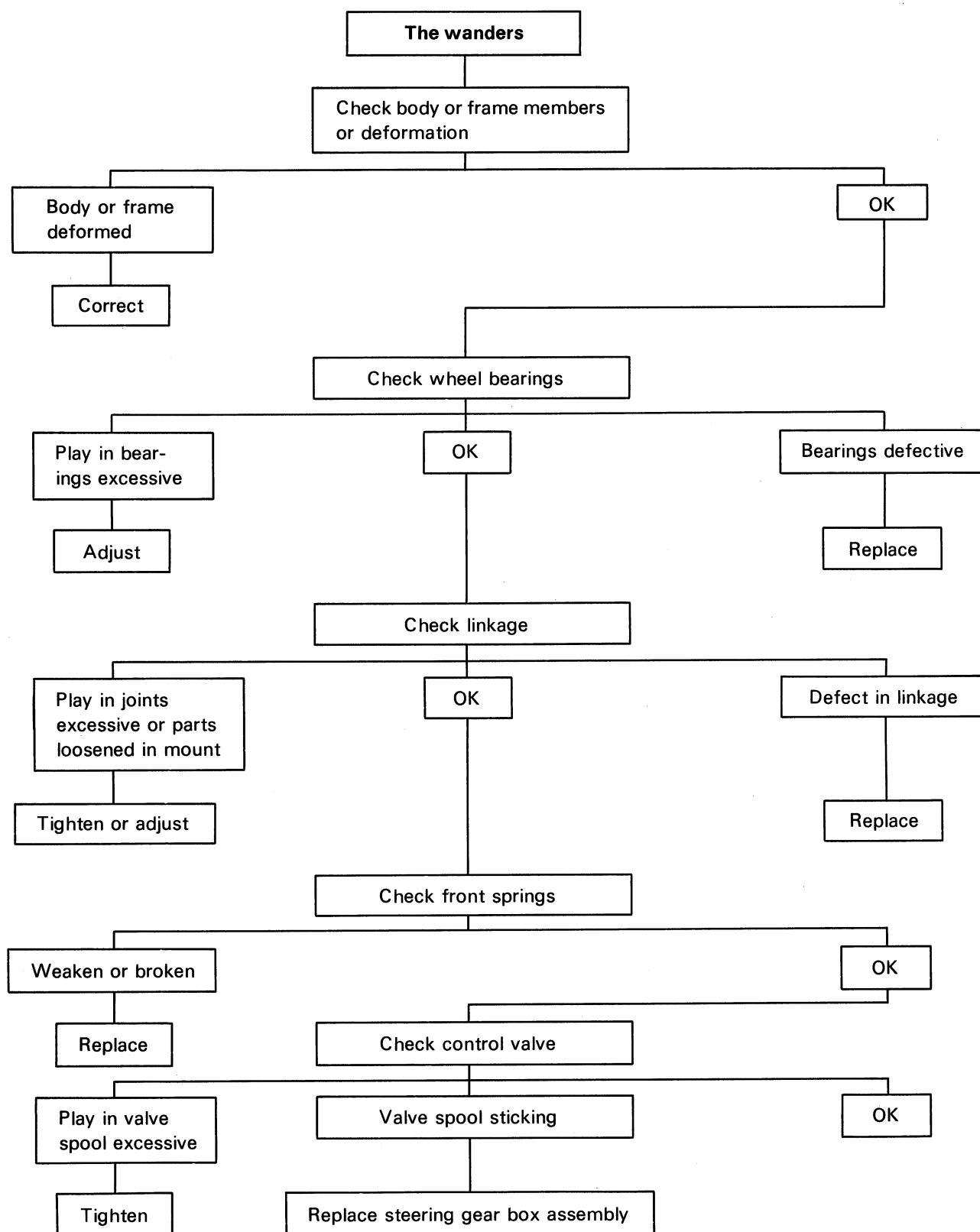


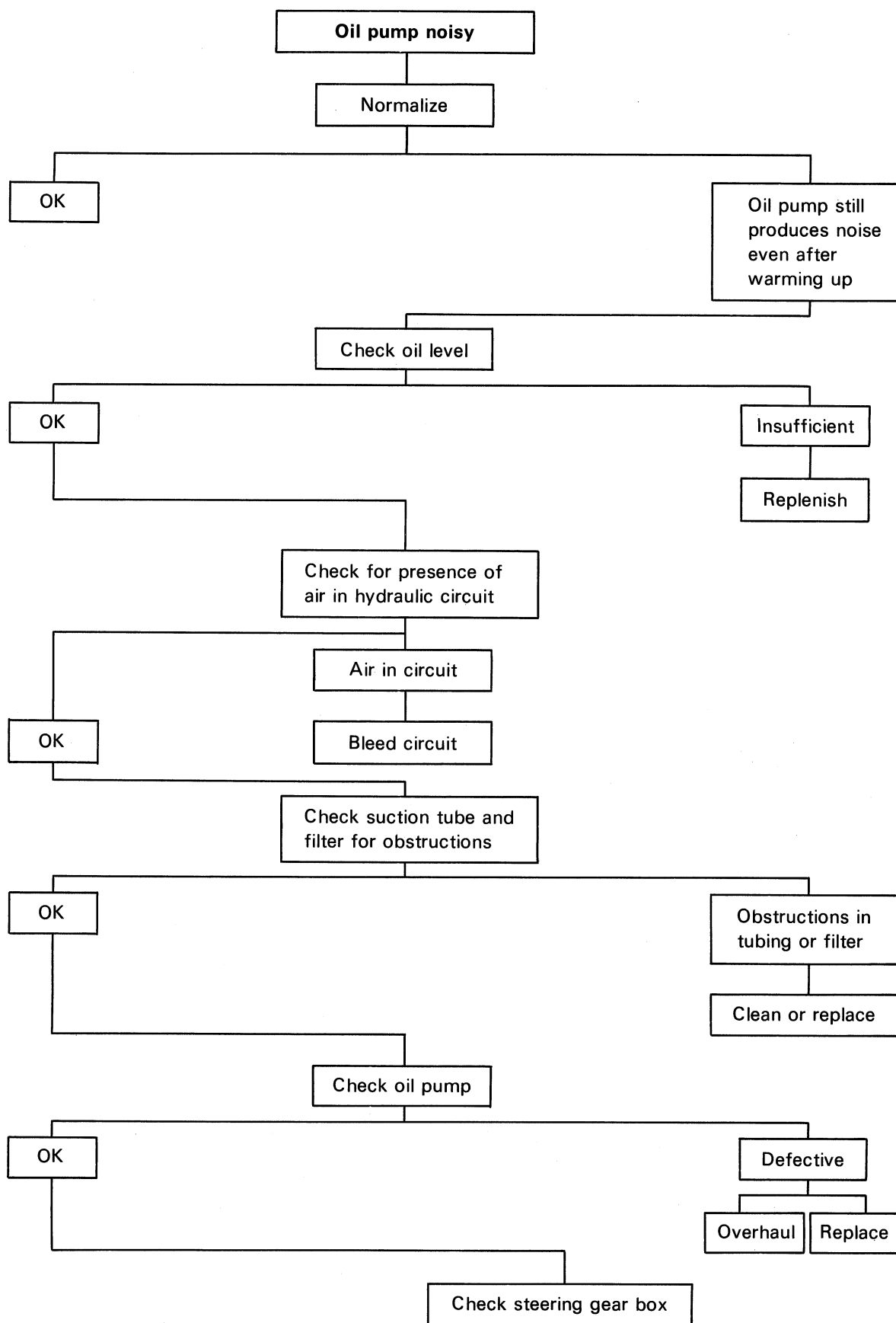




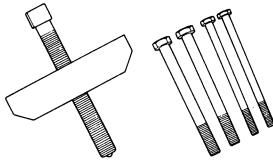
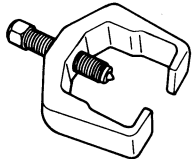
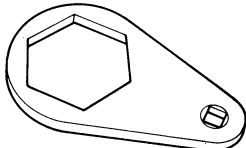
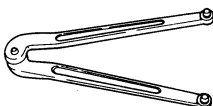
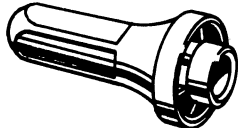
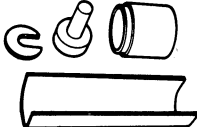
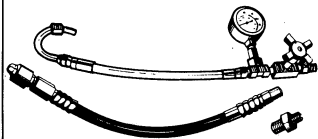
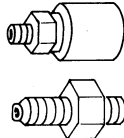
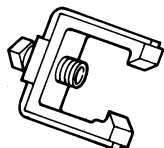
POWER-STEERING







SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-29752	Puller ; steering wheel
		J-29107	Pitman arm remover idler arm remover
		J-29753	Input cover locknut wrench
		J-7624	Clutch hub holder
		J-26508	Extension housing oil seal installer
		J-29755	Upper link bushing remover & installer
		J-29877-A	Power steering tester
		J-33996	Adapter ; power steering tester
		J-21687-02	Tie-rod remover

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SECTION 11

BODY

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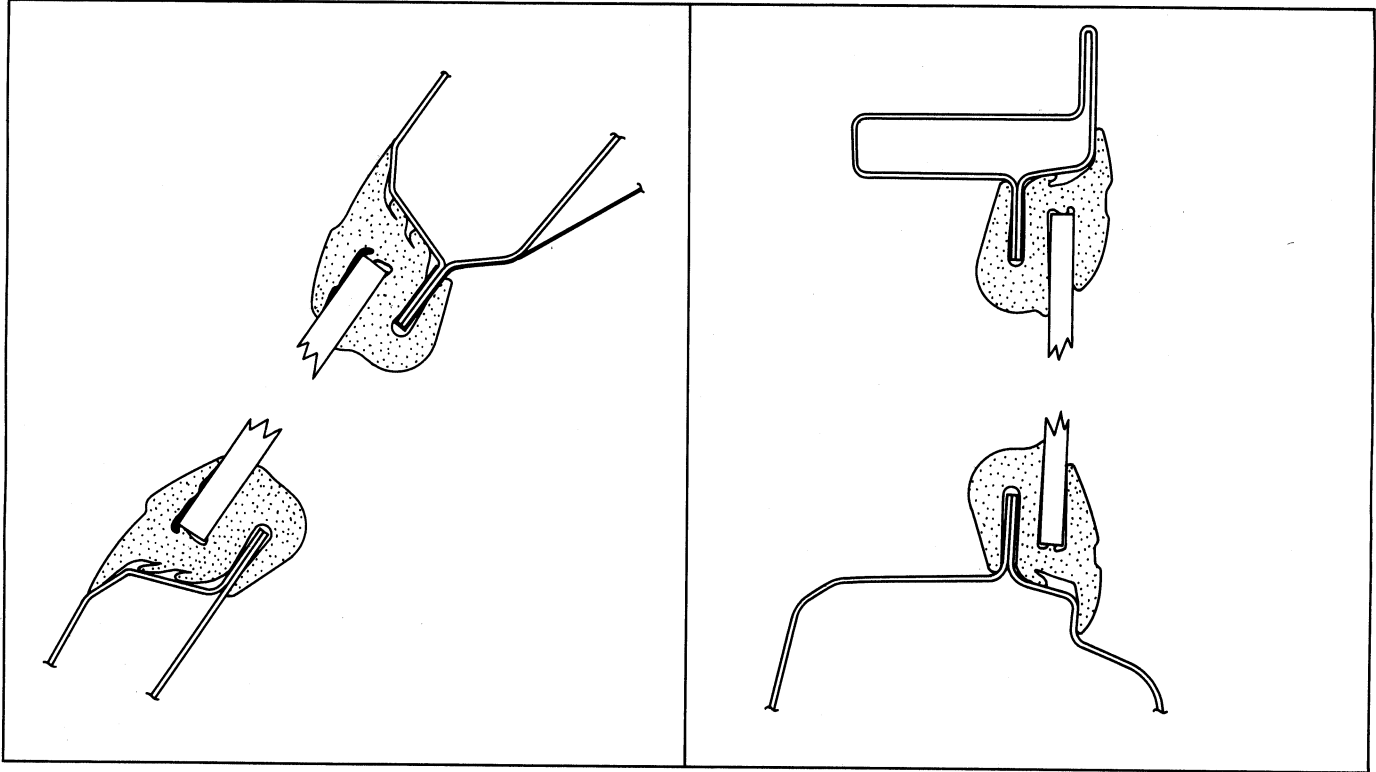
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WINDSHIELD AND BACK LIGHT GLASS

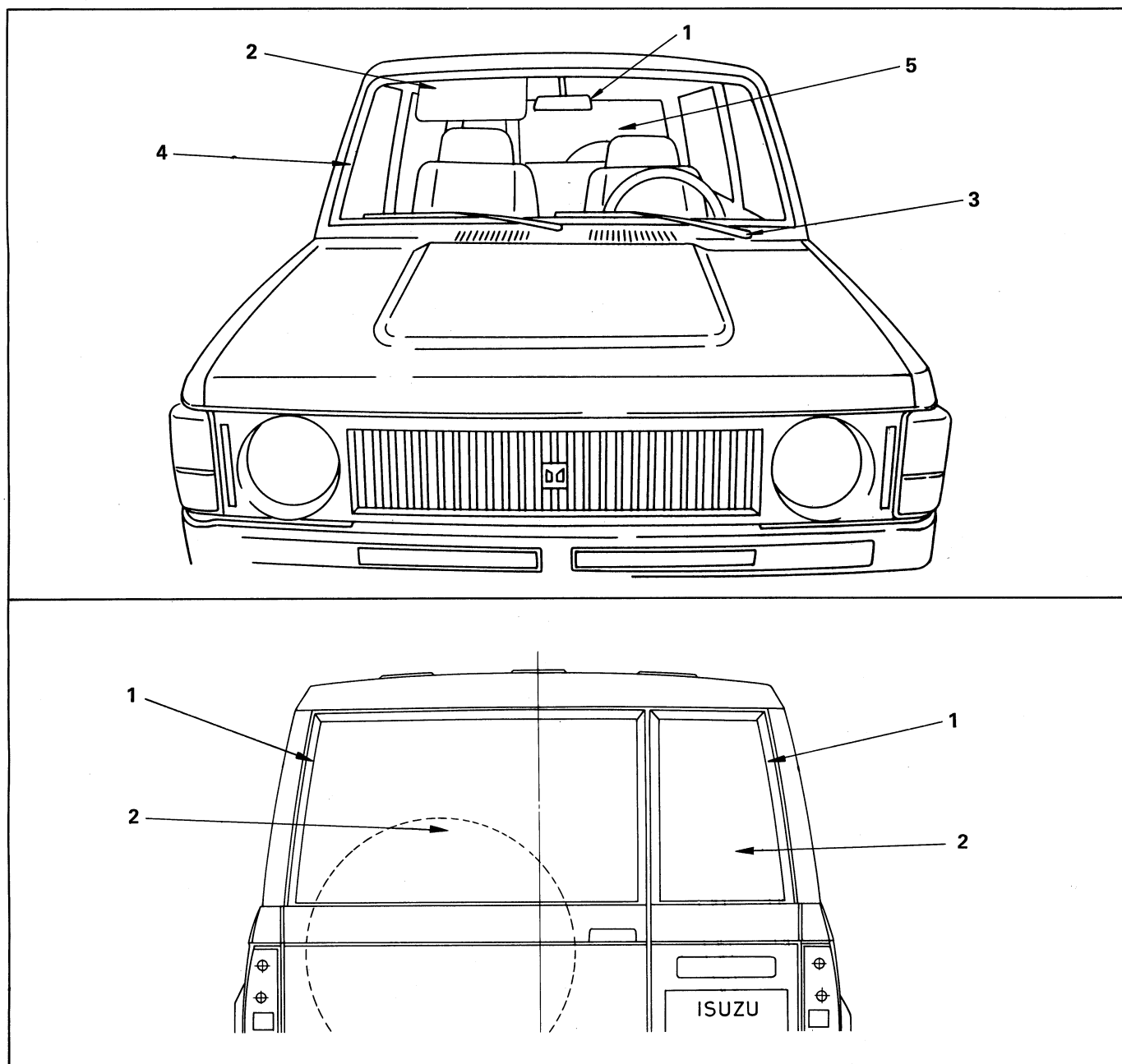
GENERAL DESCRIPTION

WINDSHIELD GLASS

BACK LIGHT GLASS



↔ ↔ REMOVAL AND INSTALLATION



REMOVAL STEPS

Windshield glass

- ▲ 1. Rear view mirror
- 2. Sun visor
- 3. Wiper arm assembly
- ▲ 4. Weather strip
- 5. Windshield glass

Back light glass

- ▲ 1. Weather strip
- 2. Back light glass

INSTALLATION STEPS

Windshield glass

- 5. Windshield glass
- ▲ 4. Weather strip
- 3. Wiper arm assembly
- 2. Sun visor
- 1. Rear view mirror

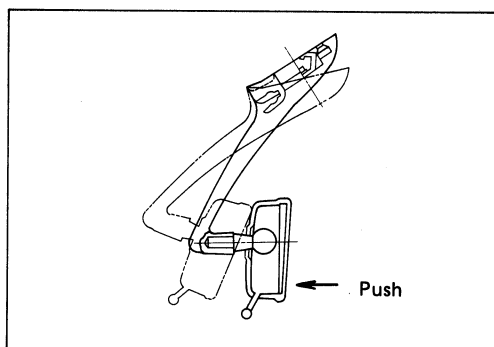
Back light glass

- 2. Back light glass
- ▲ 1. Weather strip



Important operation — Removal

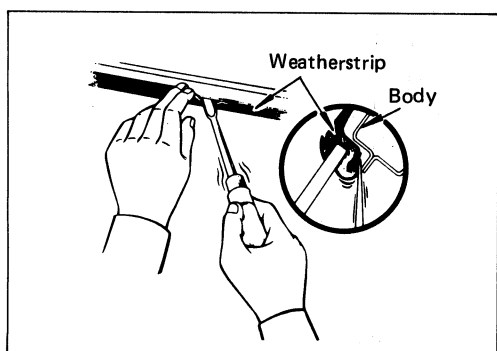
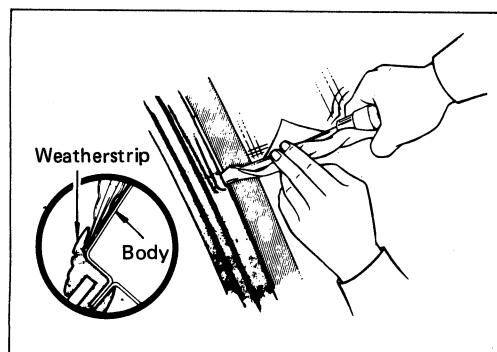
1. Rear view mirror (windshield glass)



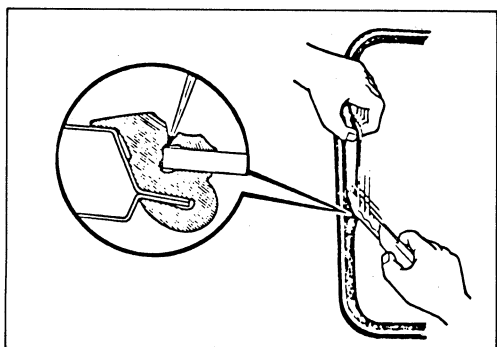
4. Weather strip (windshield glass)

1. Weather strip (back door glass)

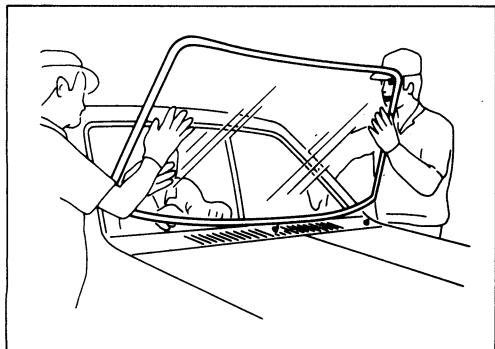
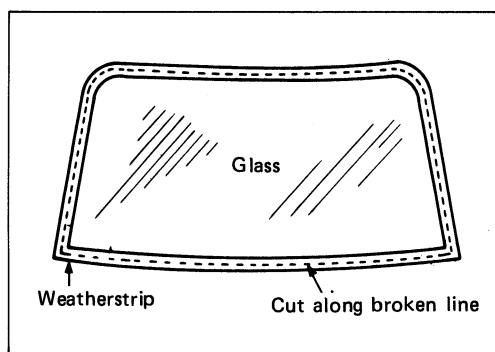
Loosen the weather strip from the body using a screw driver.



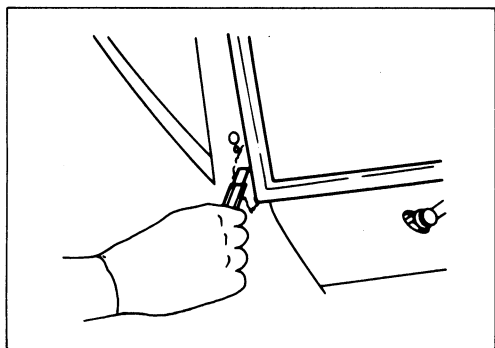
When reusing the weather strip, force the weather strip lip from the interior to the body flange outside. Pull the glass outward and remove with the weather strip.



When replacing the weather strip, cut the weather strip using a knife.



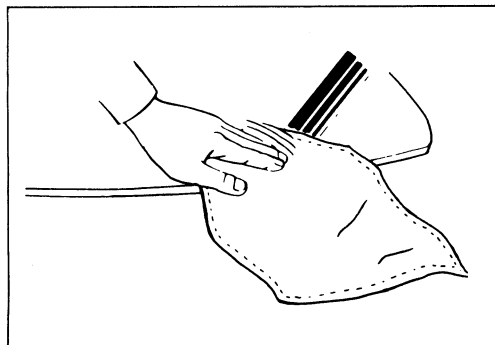
Remove the windshield glass by applying pressure from the inside of the passenger compartment.



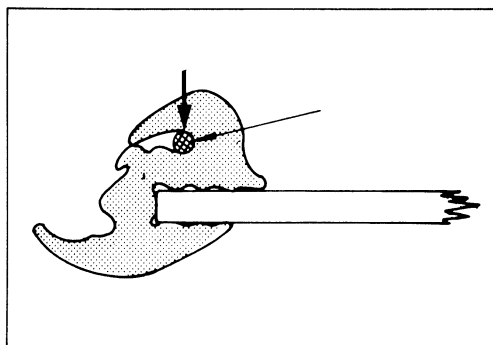
Remove all traces of sealer from the body and windshield glass using a cleaner and a knife.



Important operation — Installation



Wipe off all sealer left on the body or glass with alcohol.

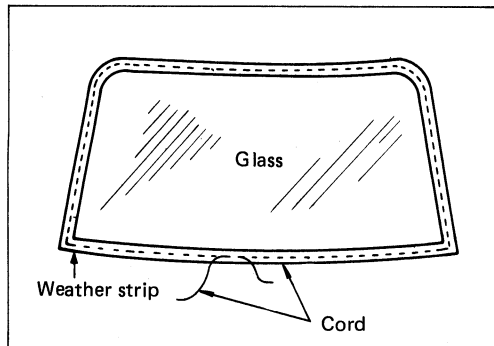


4. Weather strip (windshield glass)

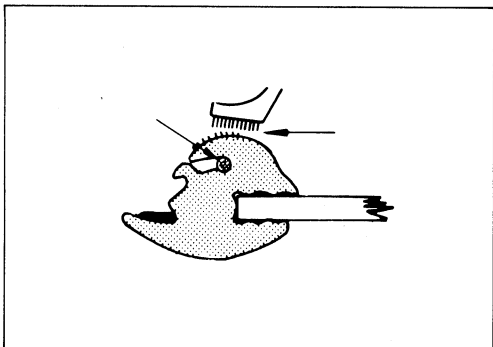
1. Weather strip (back door glass)

Install the weather strip on the windshield glass at the corners first by expanding the cavity with a twisting motion, then set the remaining portions in sequence.

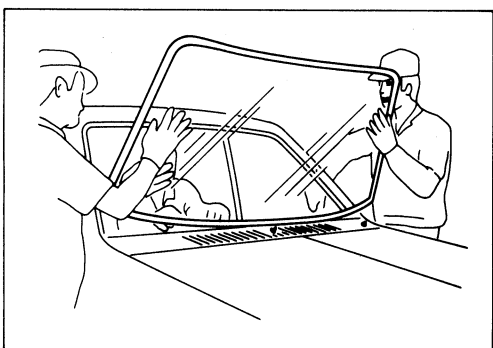
Using a screwdriver, insert the cord into the body flange fitting cavity of the weather strip.



The cord should be a sufficiently long, so that its ends overlap at the lower center part of the windshield glass by about 100 mm (4 in.) after going around the circumference of the windshield glass.

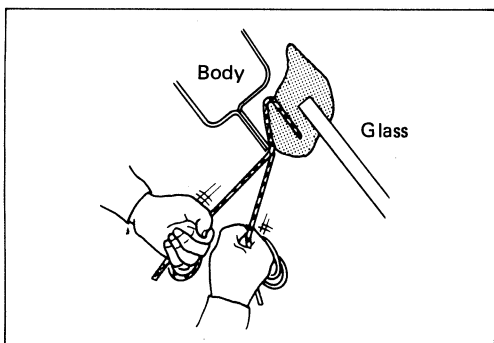


Apply soap and water around the circumference of the weather strip to facilitate installation of the windshield glass into the body flange.

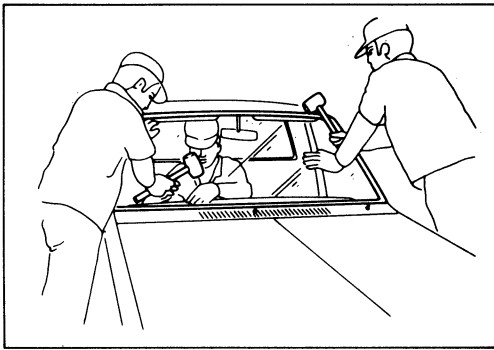


With the aid of someone outside, hold the windshield glass in alignment with the body flange and push it inward.

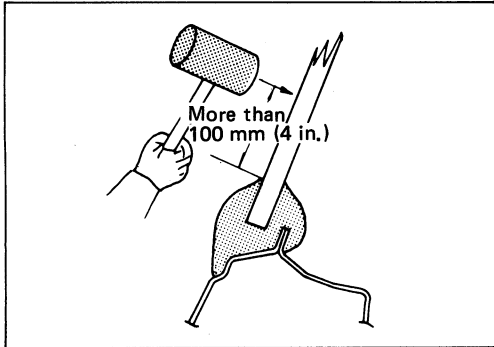
The center of the windshield glass should be in alignment with the center of the windshield glass opening.



Install the windshield glass by pulling one end of the cord in toward the center of the windshield glass from inside the body.



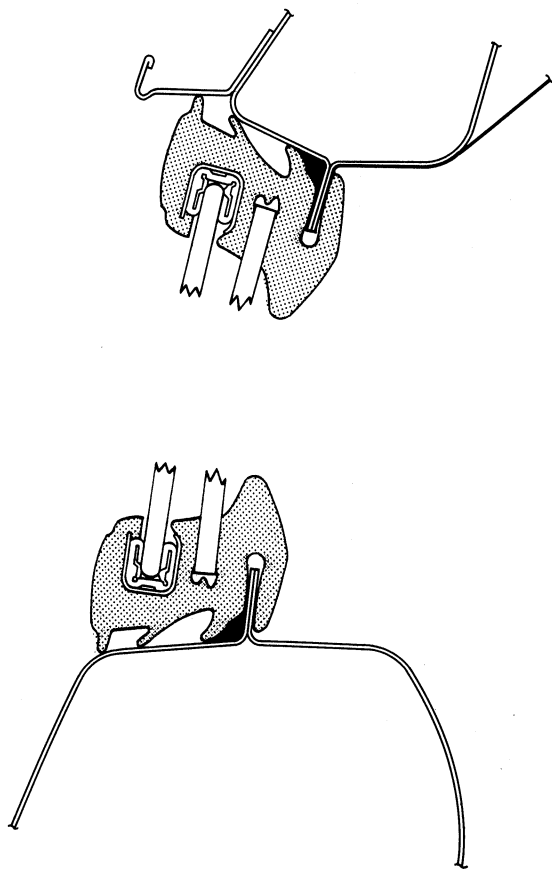
When the windshield glass is fitted into position, tap on the windshield glass from outside the body with a rubber hammer to facilitate proper setting of the windshield glass into the body flange.



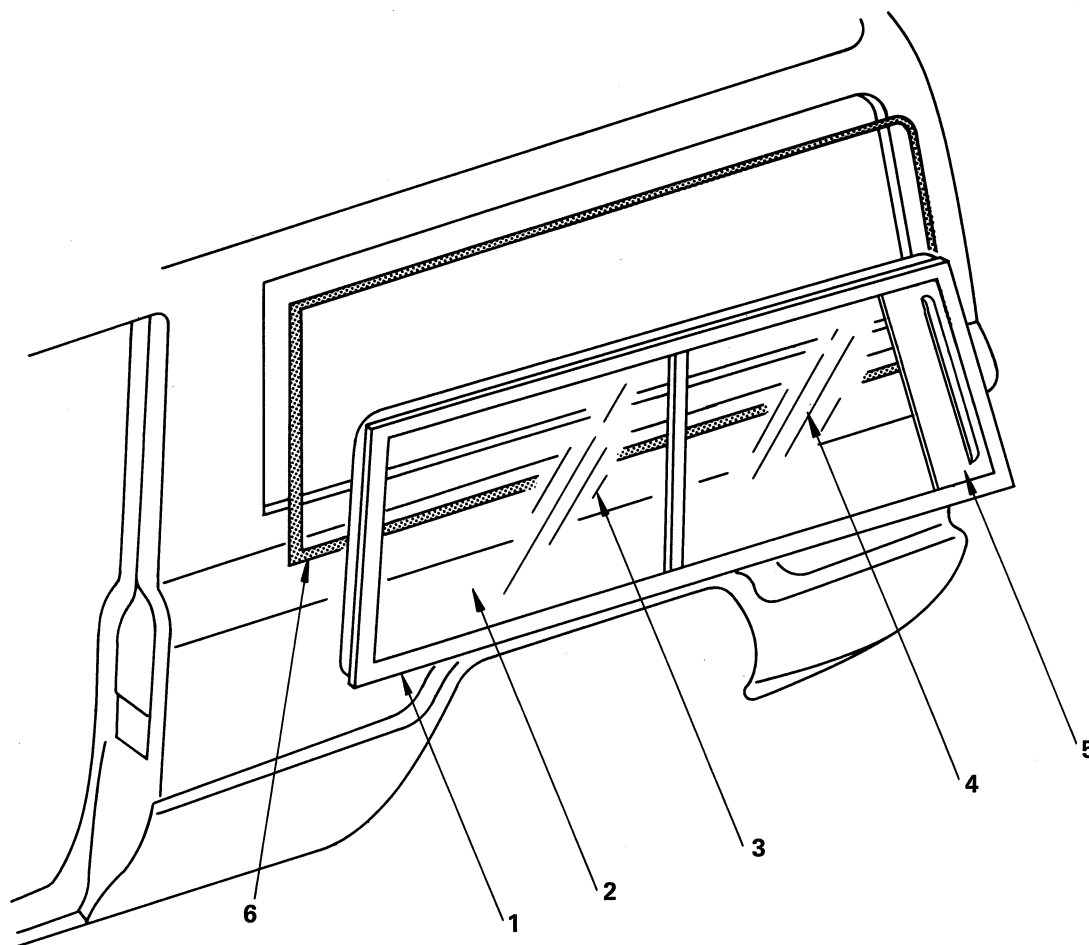
Tap on the windshield glass at portions more than 100 mm (4 in.) away from the weather strip.

SIDE GLASS

GENERAL DESCRIPTION



↔ ↔ **REMOVAL AND INSTALLATION**



Removal steps

- ▲ 1. Weather strip
- 2. Side window assembly
- 3. Side glass
- 4. Side glass
- 5. Side ventilation
- 6. Butyl tape

Installation steps

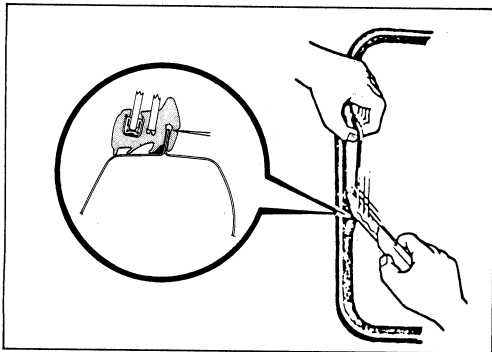
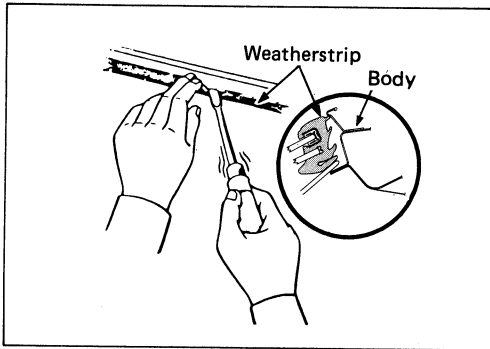
- 6. Butyl tape
- 5. Side ventilation
- 4. Side glass
- 3. Side glass
- 2. Side window assembly
- ▲ 1. Weather strip



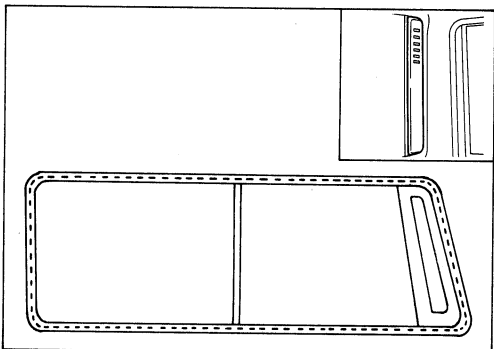
Important operations — Removal and Installation

1. Weather strip

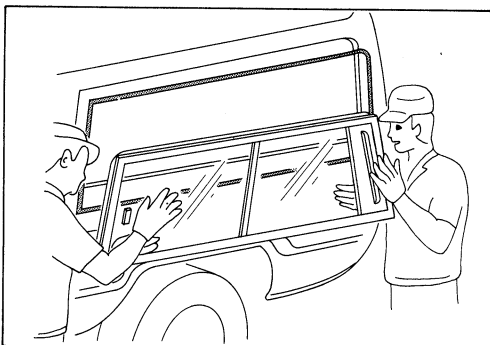
When reusing the weather strip, force the weather strip lip from the interior to the body flange outside. Pull the glass outward and remove with the weather strip.



When replacing the weather strip, cut the weather strip using a knife.



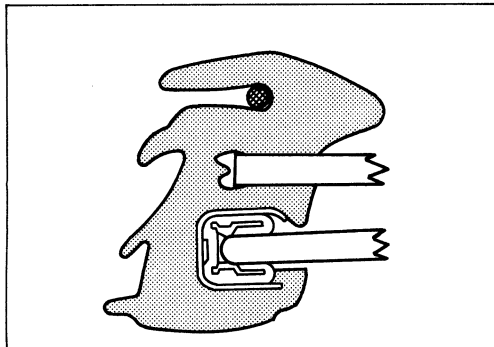
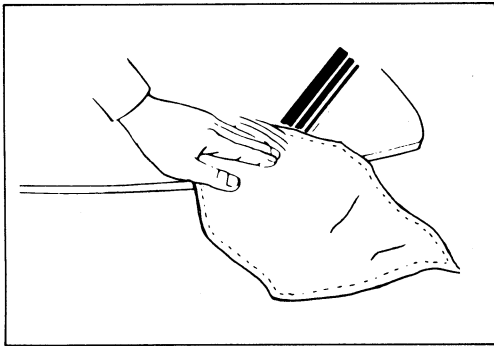
Remove the side glass by applying pressure from inside the body.





Important operations — Installation

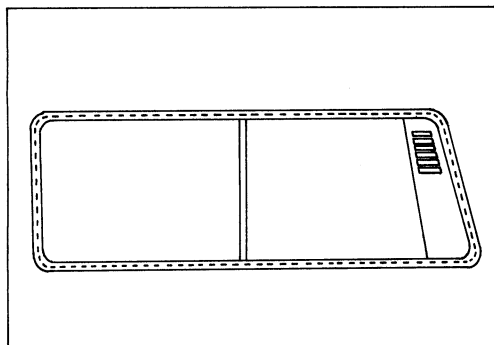
Wipe off all sealer left on the body or glass with alcohol.



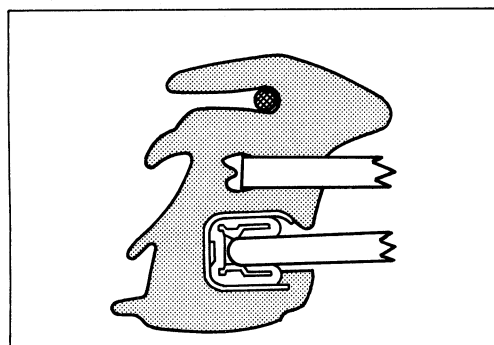
1. Weather strips

Install the weather strip on the side glass at the corners first by expanding the cavity with twisting motion, then set the remaining portions in sequence.

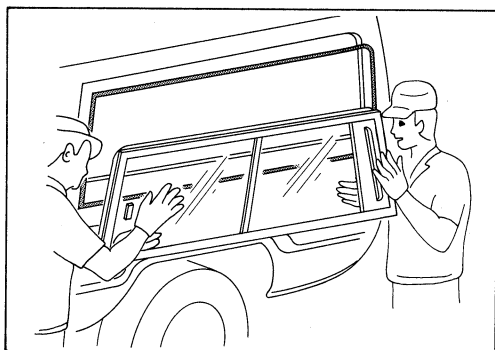
Using the screwdriver, insert the cord into the body flange fitting cavity of the weather strip.



The cord should be long enough, so that its ends overlap at the lower center part of the side glass about 100 mm (4 in.) after going around the circumference of the windshield glass.

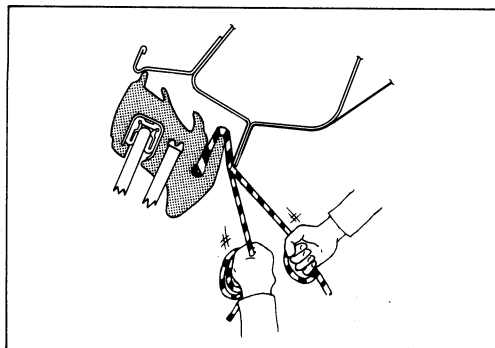


Apply soap and water around the circumference of the weather strip to facilitate installation of the side window assembly into the body flange.

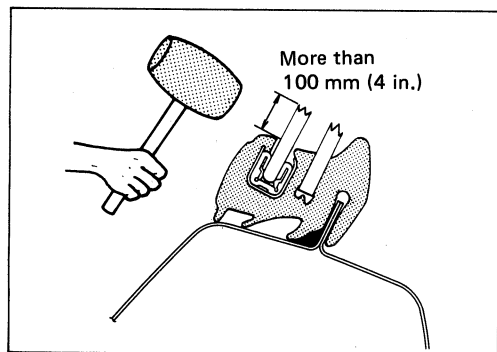


With the aid of someone outside, hold the side window assembly in alignment with the body flange and push it inward.

The center of the side window should be in alignment with the center of the side window opening.



Install the windshield glass by pulling one end of the cord in toward the center of the windshield glass from inside the body.

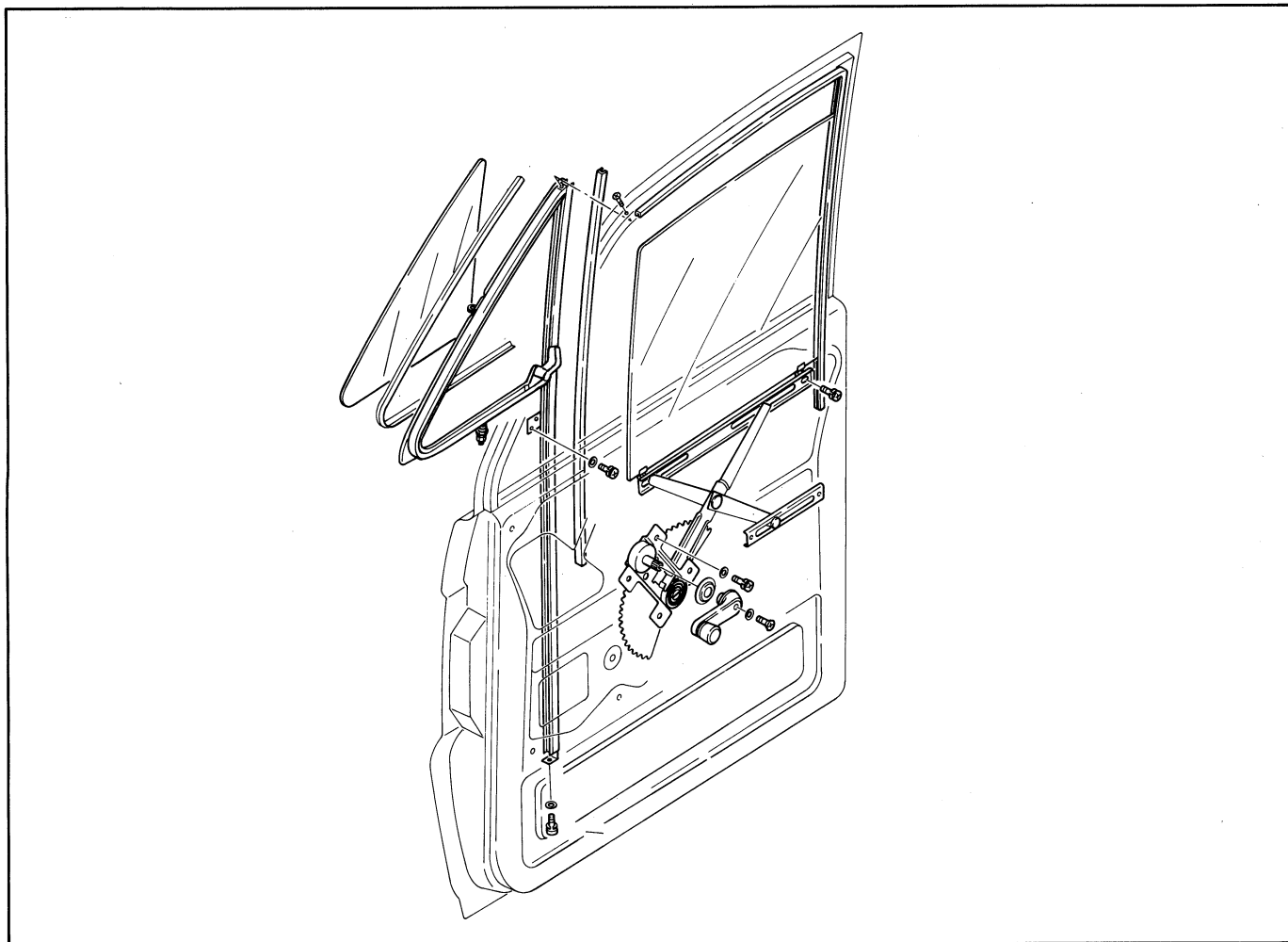


When the side window assembly is fitted into position, tap on the side glasses from outside the body with a rubber hammer to facilitate proper setting of the side window assembly into the body flange.

Tap on the side glasses at portions more than 100 mm (4 in.) away from the weather strip.

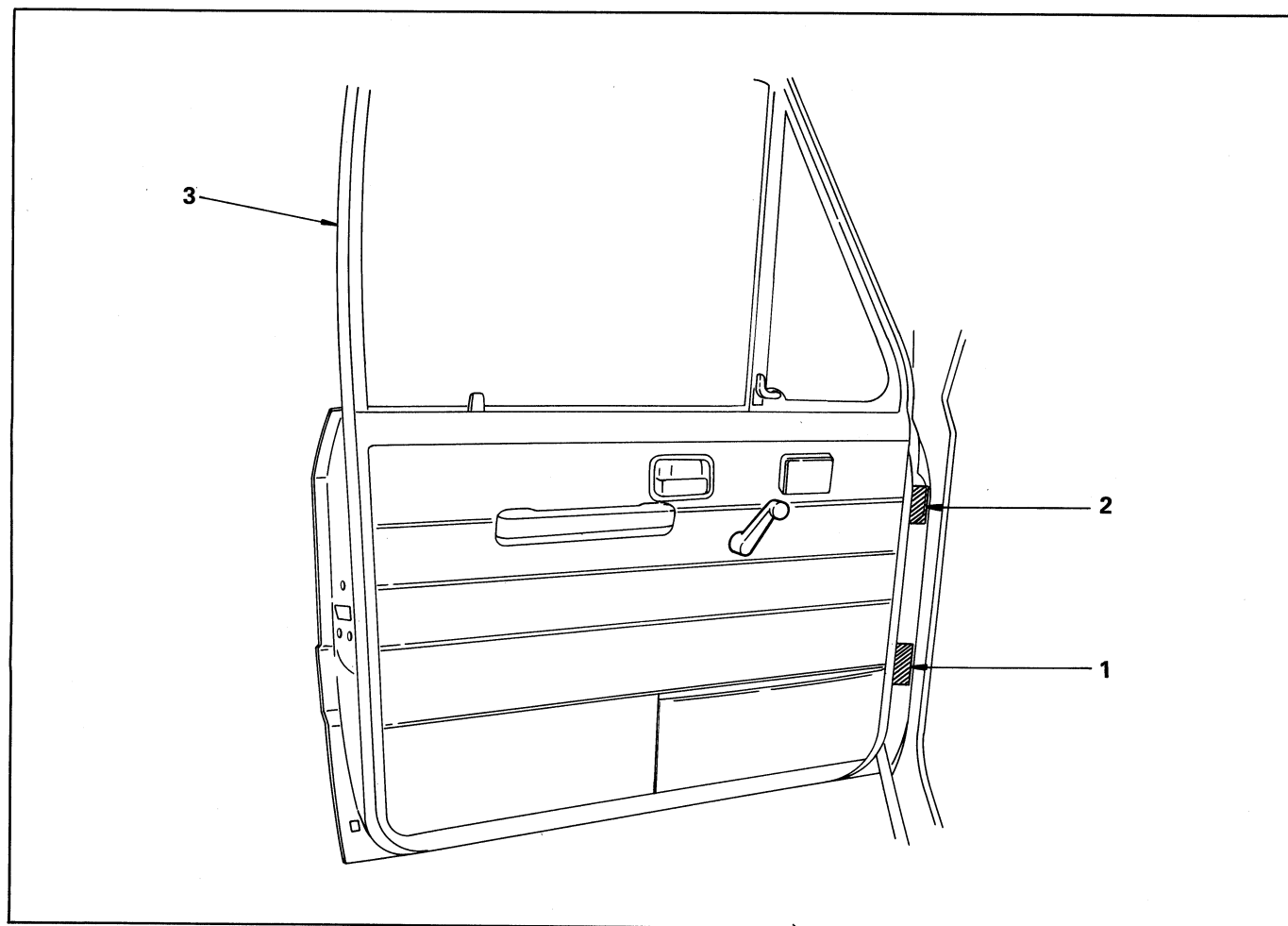
FRONT DOORS

GENERAL DESCRIPTION





REMOVAL AND INSTALLATION



Removal steps

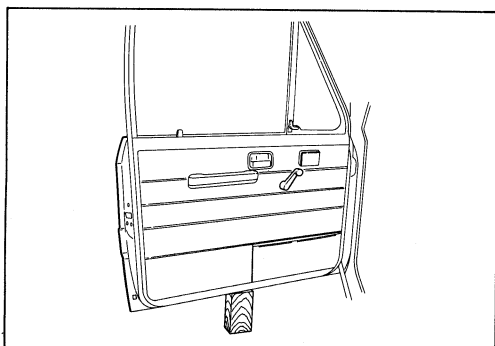
- ▲ 1. Lower hinge
- 2. Upper hinge
- ▲ 3. Door assembly

Installation steps

- ▲ 3. Door assembly
- 2. Upper hinge
- 1. Lower hinge



Important operation — Removal and Installation

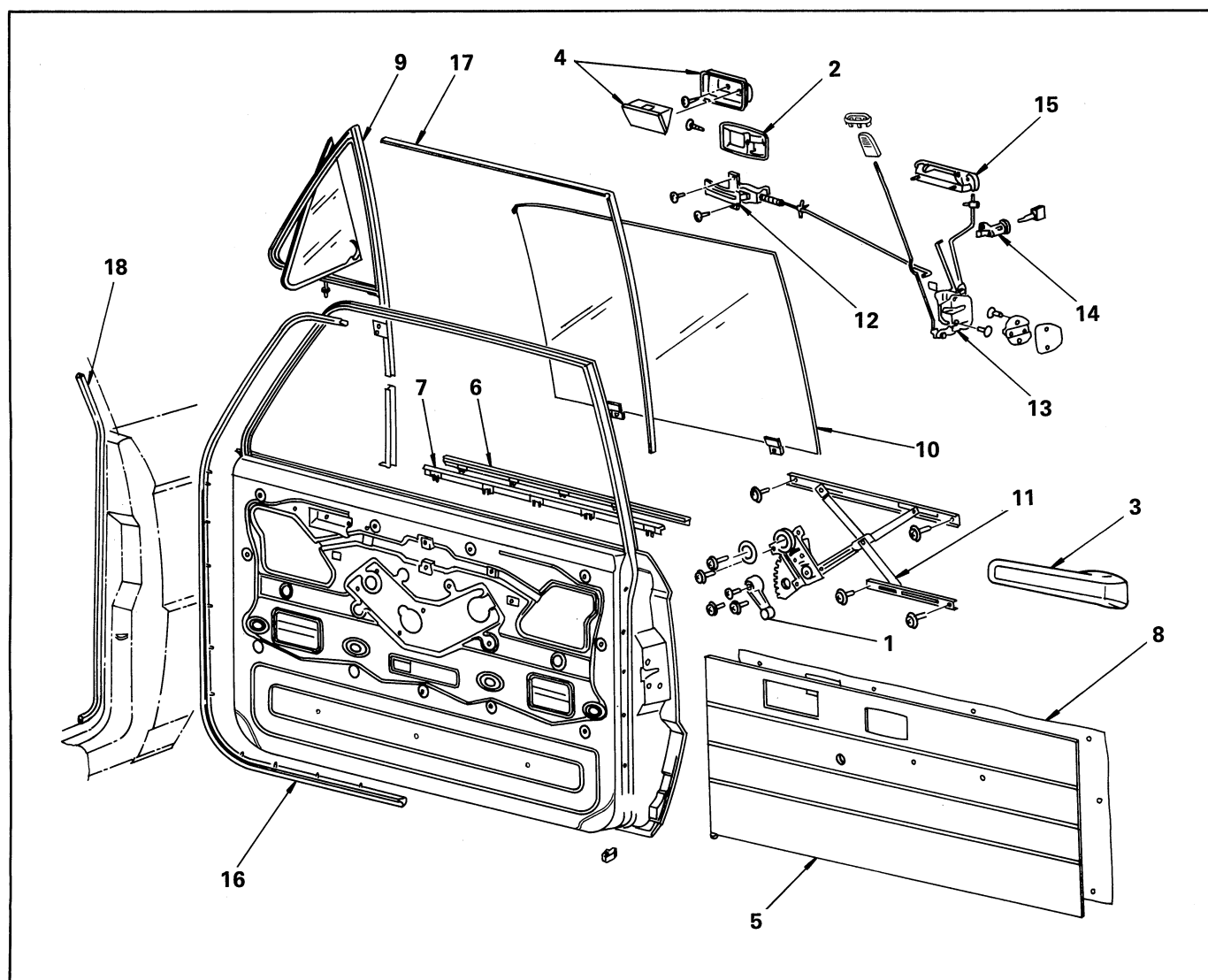


- 1. Lower hinge
- 3. Door assembly

Position a wood block under the door for protection and support the door assembly with your hands during removal or installation.



DISASSEMBLY

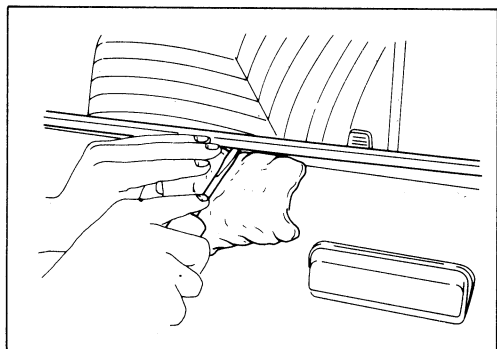


Disassembly steps

- | | |
|--------------------------|--------------------------|
| 1. Regulator handle | ▲ 10. Window glass |
| 2. Bezel and escutcheon | ▲ 11. Window regulator |
| 3. Pull handle | 12. Inside handle |
| 4. Ash tray | ▲ 13. Door lock assembly |
| 5. Trim pad | ▲ 14. Door lock cylinder |
| ▲ 6. Outer waist seal | 15. Outside handle |
| ▲ 7. Inner waist seal | 16. Weather strip |
| ▲ 8. Water seal | 17. Glass run |
| ▲ 9. Cross vent assembly | 18. Finisher |



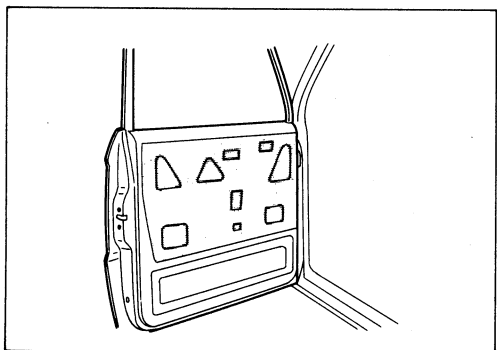
Important operations



6. Outer waist seal

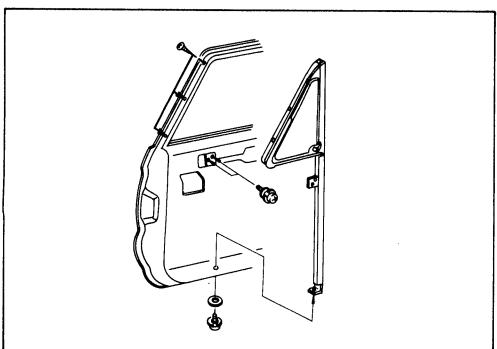
7. Inner waist seal

Remove the outer and inner waist seals using a screw driver.



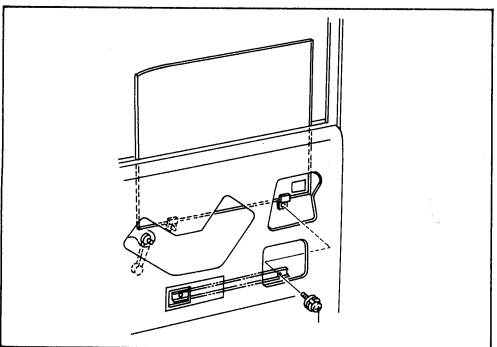
8. Water seal

Remove the water seal carefully so as not to break it.



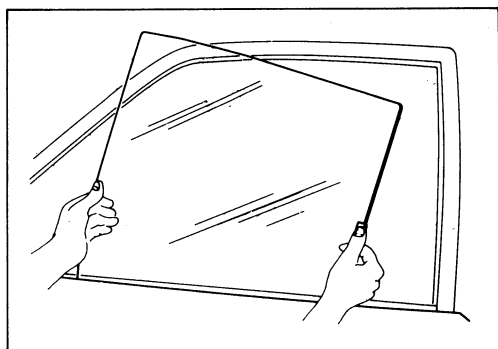
9. Cross vent assembly

Remove the screws as shown, then pull it upward.

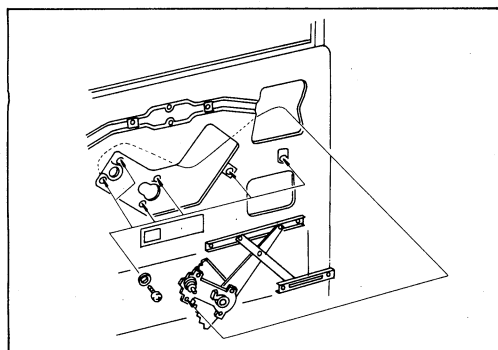


10. Window glass

Remove the two screws holding the bottom channel of the regulator, then lower the glass.

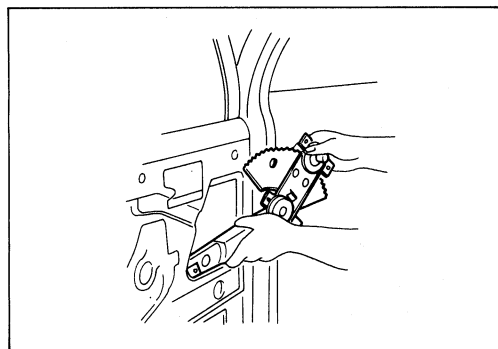


Remove the window glass by pulling it upward.

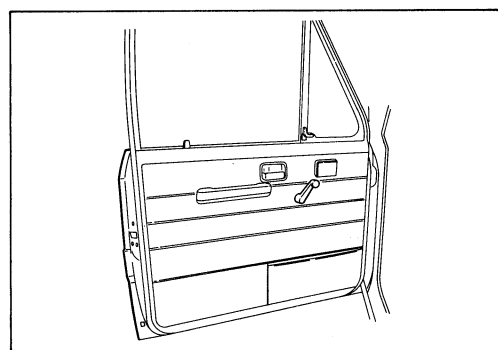


11. Window regulator

Remove the screw holding the regulator.

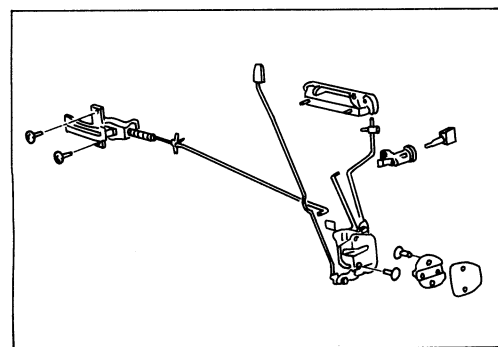


Remove the regulator assembly through the access hole in the door panel.

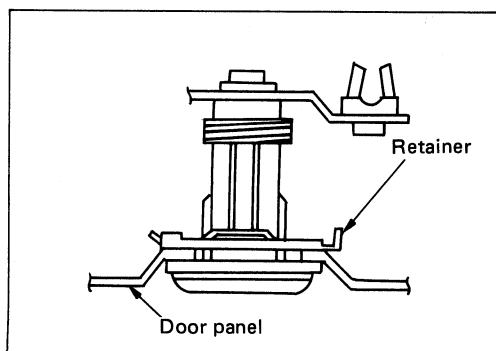


13. Door lock assembly

Remove the 3 bolts holding the door lock assembly.



Disconnect the linkage from the door outside handle, inside lever and lock cylinder.



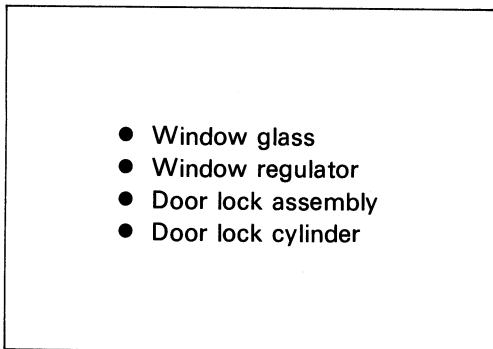
14. Door lock cylinder

Remove the door lock cylinder by applying finger pressure from inside while depressing the retaining clip.



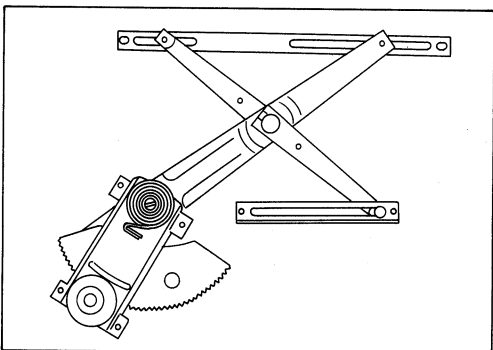
INSPECTION AND REPAIR

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.



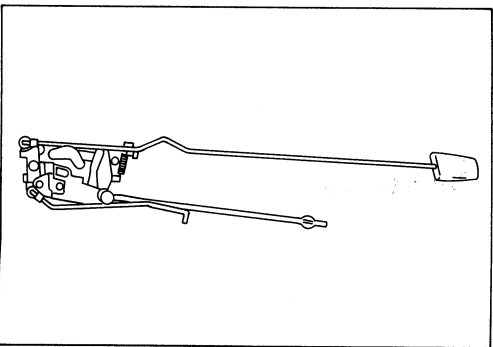
Visual checks

Inspect the following parts for wear, damage, or other abnormal conditions.



Inspection of window regulator

- (a) Check the gears for wear.
- (b) Check the spring for weakness and good condition.
- (c) Apply grease to sliding parts.



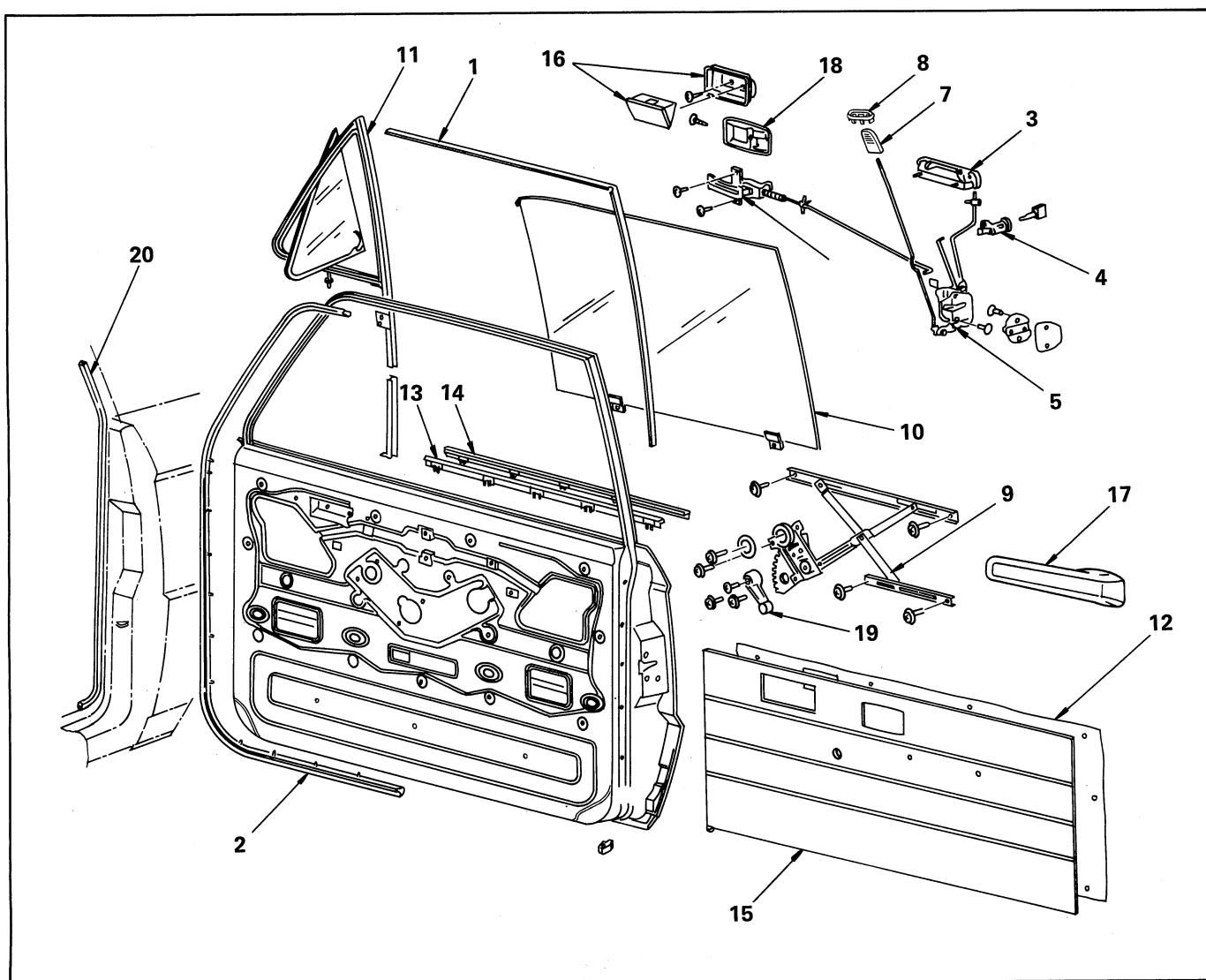
Inspection of the door lock assembly

Check the operation of the door lock.

Apply grease to sliding parts as necessary.



REASSEMBLY



Reassembly steps

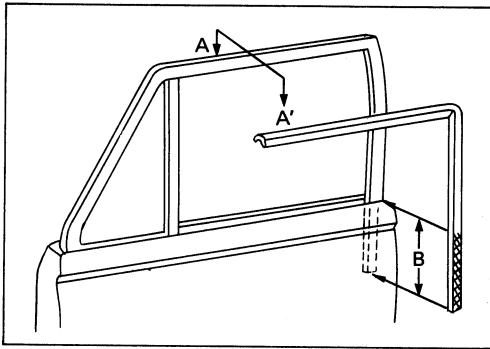
- | | |
|-------------------------|----------------------------|
| ▲ 1. Glass run | ▲ 11. Cross vent assembly |
| ▲ 2. Weather strip | ▲ 12. Water seal |
| ▲ 3. Outside handle | ▲ 13. Inner waist seal |
| ▲ 4. Door lock cylinder | ▲ 14. Outer waist seal |
| ▲ 5. Door lock assembly | ▲ 15. Trim pad |
| ▲ 6. Inside handle | ▲ 16. Ash tray |
| ▲ 7. Knob | ▲ 17. Pull handle |
| ▲ 8. Escutcheon | ▲ 18. Bezel and escutcheon |
| ▲ 9. Window regulator | ▲ 19. Regulator handle |
| ▲ 10. Window glass | ▲ 20. Finisher |



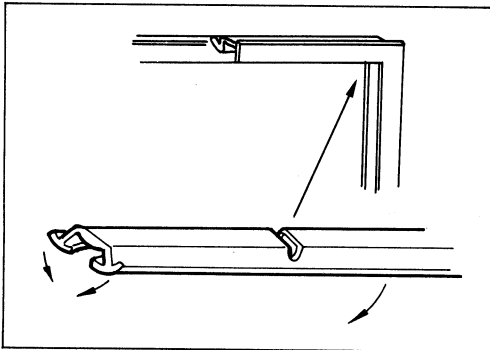
Important operations

1. Glass run

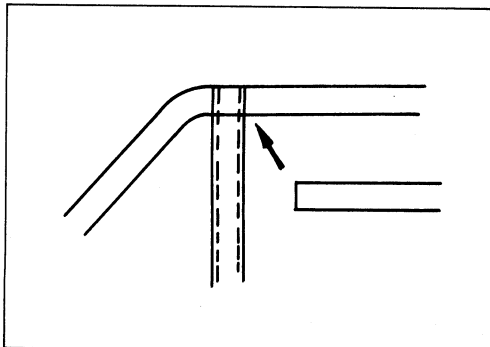
Apply adhesive to the B portion.



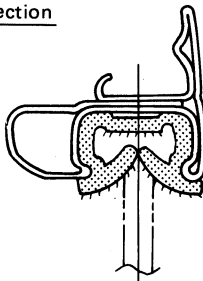
Bend the glass run at the cutaway portion.



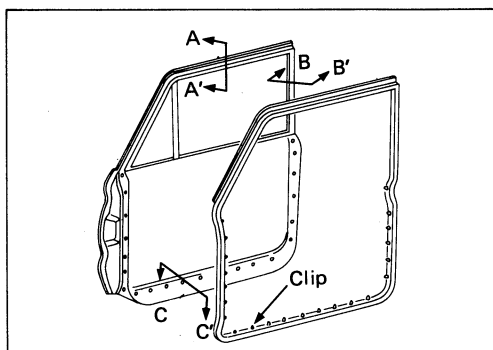
Cut off the excess portion of the glass run when installing the cross vent assembly.



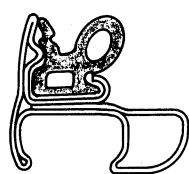
A-A' Section



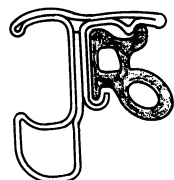
2. Weather strip



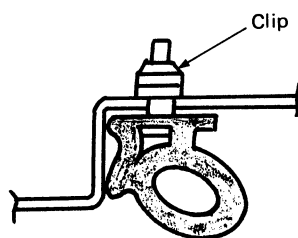
A-A' Section



B-B' Section



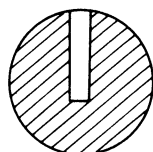
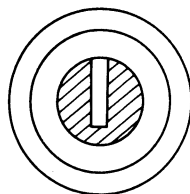
C-C' Section



4. Door lock cylinder

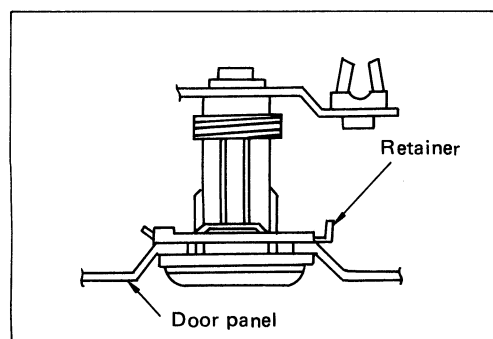
Install the door lock cylinder with the correct side up.

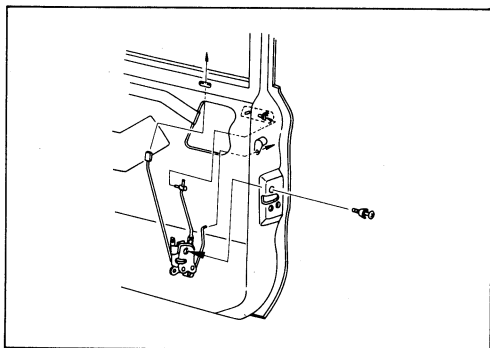
Upper side



Lower side

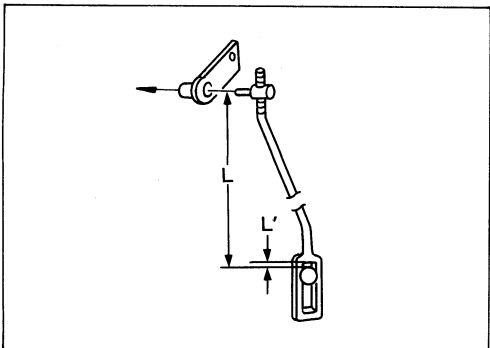
Check that the claw portion is fitted properly and that the door lock cylinder does not move.





5. Door lock assembly

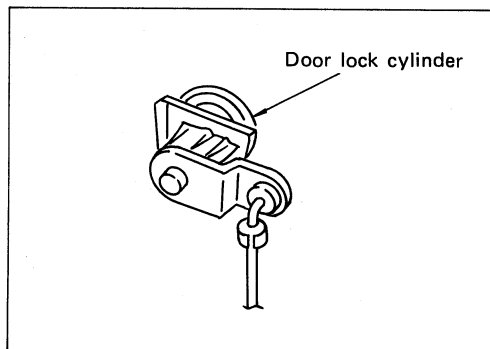
Insert the door lock assembly into position through the access hole in the door panel.



Adjust the clearance L' in order to obtain free play of outside handle.

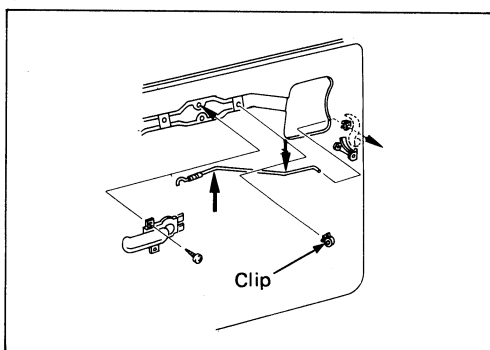
Clearance L'	mm(in.)	0.5 — 1.0
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Adjust the height L and then connect it with the outside handle.



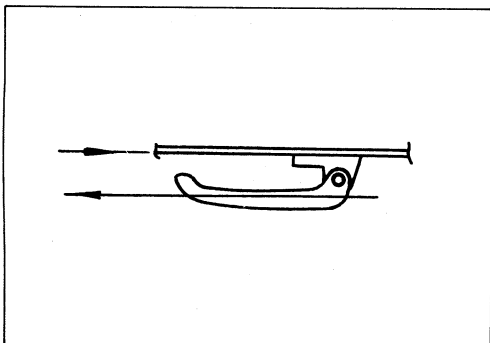
The above valve is adequate for the handle when the door lock rod is in the unlocked position.

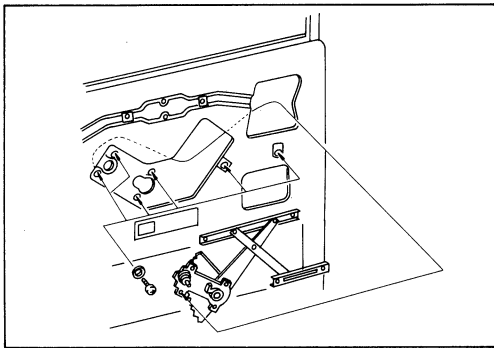
Play should be 0 (zero) when door lock rod is locked.



6. Inside handle

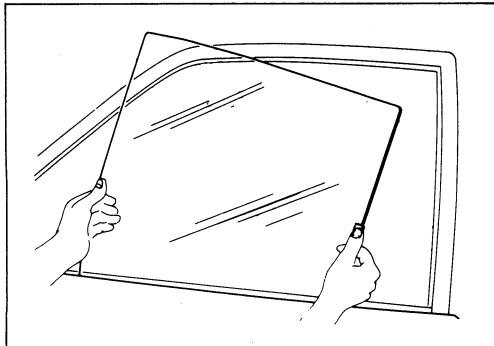
- Install the inside handle so that it is parallel with the door panel by bending the link rod.
- Clip the link rod.





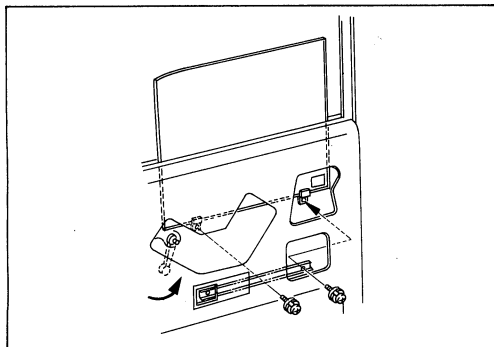
9. Window regulator

- Insert the regulator assembly into position through the access hole in the door panel.
- Fix the regulator assembly in position with the 5 screws.

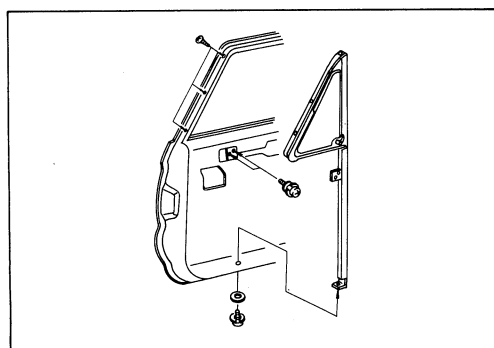


10. Window glass

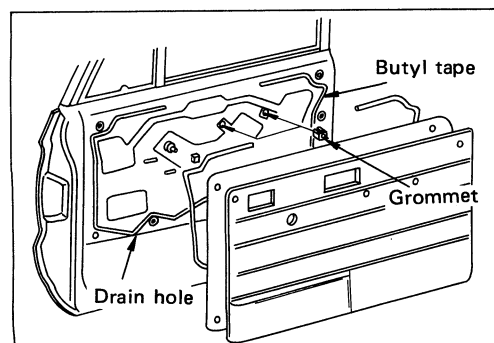
Insert the window glass into position by tilting it as necessary, then set it against the channel of the window regulator.



Attach the window glass to the window regulator with the two screws.



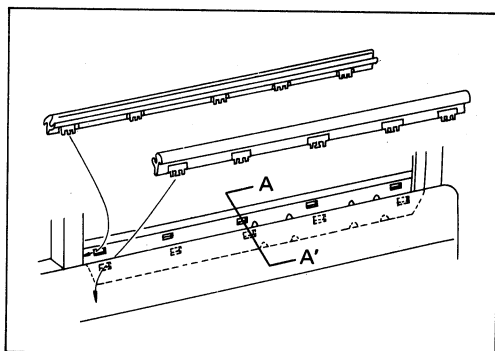
11. Cross vent assembly



12. Water seal

15. Trim pad

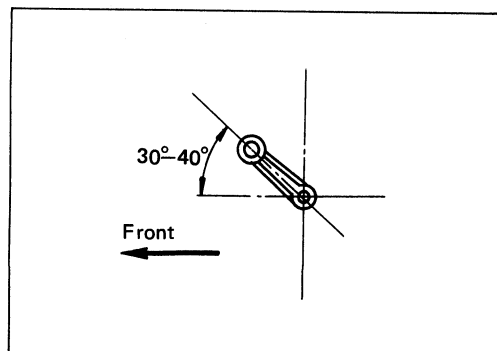
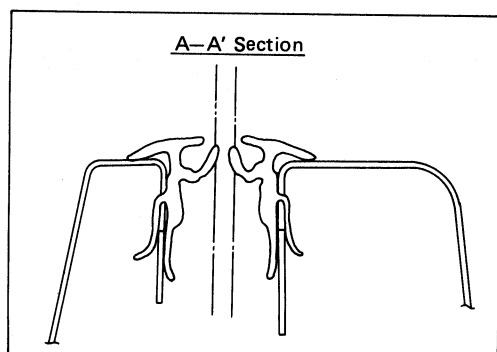
Place the butyl tape on the door panel so as not to cover the drain hole, and then install the water seal and trim pad.



13. Inner waist seal

14. Outer waist seal

Insert the clip of the waist seal in the panel hole.

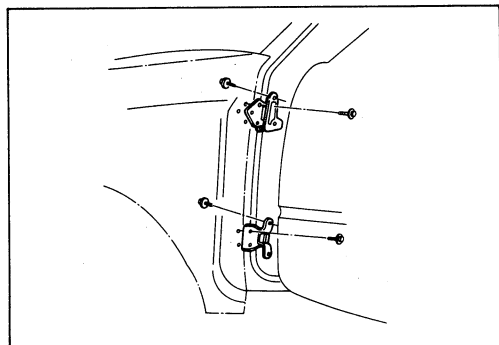


19. Regulator handle

Install the regulator handle as illustrated when closing the window glass.



ADJUSTMENT

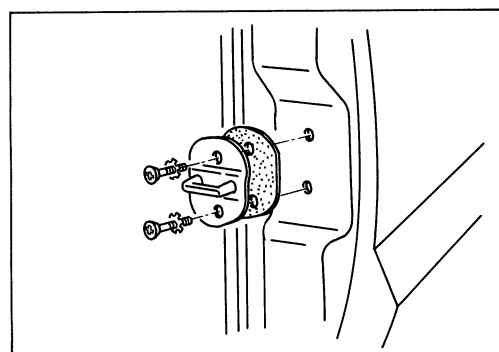


Door hinge

Door alignment can be obtained by moving the door hinges. Prior to adjustment, remove the fender and set the door temporarily.

Loosen the hinge to door bolts when adjusting the steps between the door and body.

Loosen the hinge to body bolts to adjust the clearance between the door and body.



Door striker

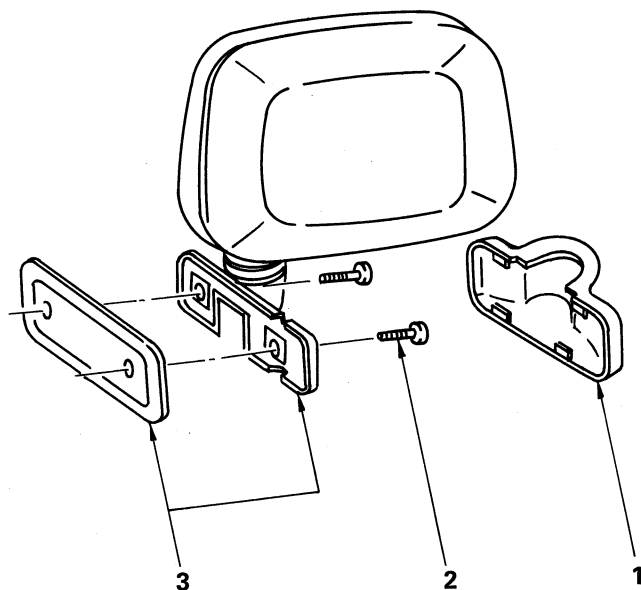
Loosen the striker screws and adjust the position of the striker by holding a piece of wood against the striker and tapping it with a hammer.

To obtain correct adjustment, move the position of the striker vertically so that the lower face of the dovetail becomes parallel with the striker.

Adjust the number of shims to control engagement of the striker with the door latch. One or two shims are generally needed to obtain correct adjustment.



REMOVAL AND INSTALLATION



Reassembly steps

1. Cover
2. Screws
3. Mirror assembly and gasket

Installation steps

3. Mirror assembly and gasket
2. Screws
- ▲ 1. Cover

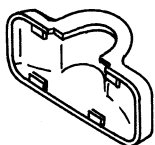


Important operation — Installation

1. Cover

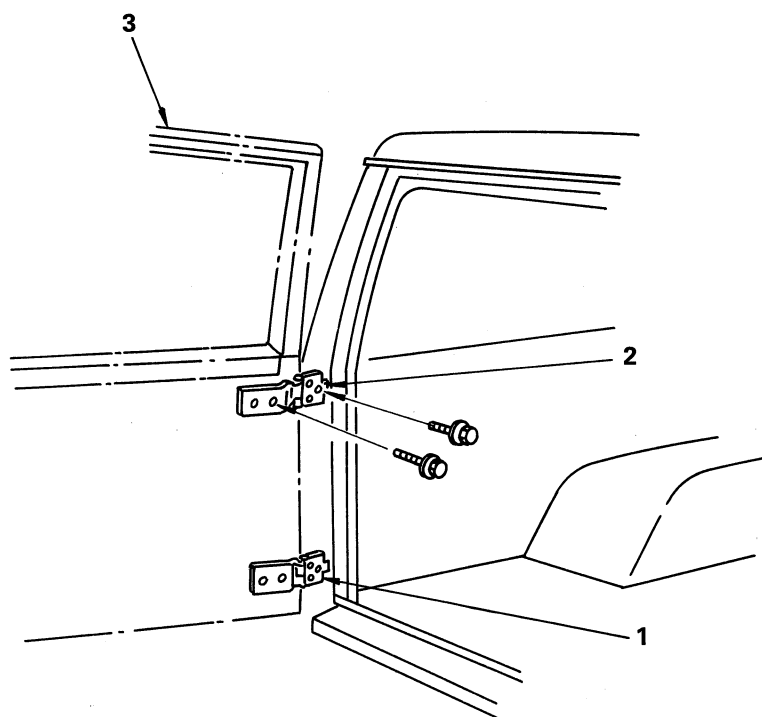
Attach the mirror to the pawls on the lower side of the cover. Then, snap shut the pawls on the upper side of the cover.

Cover



BACK DOORS

REMOVAL AND INSTALLATION



Removal steps

- ▲ 1. Lower hinge
- 2. Upper hinge
- 3. Door assembly

Installation steps

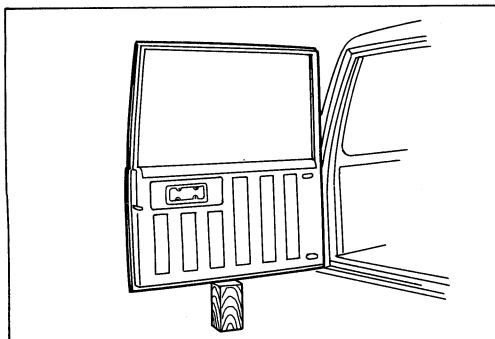
- ▲ 3. Door assembly
- 2. Upper hinge
- 1. Lower hinge



Important operations — Removal and Installation

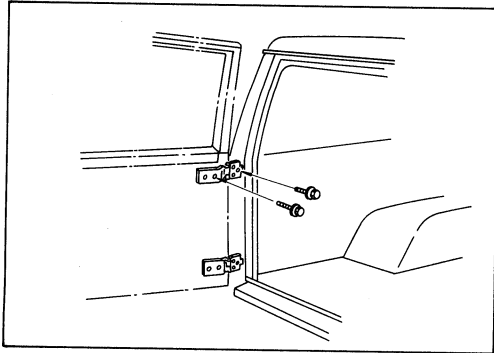
- 1. Lower hinge
- 3. Door assembly

Position a wood block under the door for protection and support the door assembly with your hands during removal or installation.





ADJUSTMENT

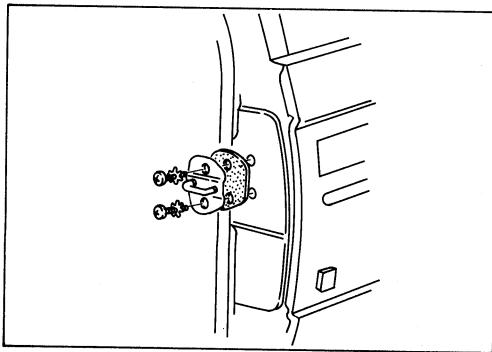


Door hinge

Door alignment can be obtained by moving the door hinges. Prior to adjustment, remove the fender and set the door temporarily.

Loosen the hinge to door bolts when adjusting the steps between the door and the body.

Loosen the hinge to body bolts to adjust the clearance between the door and the body.



Door striker

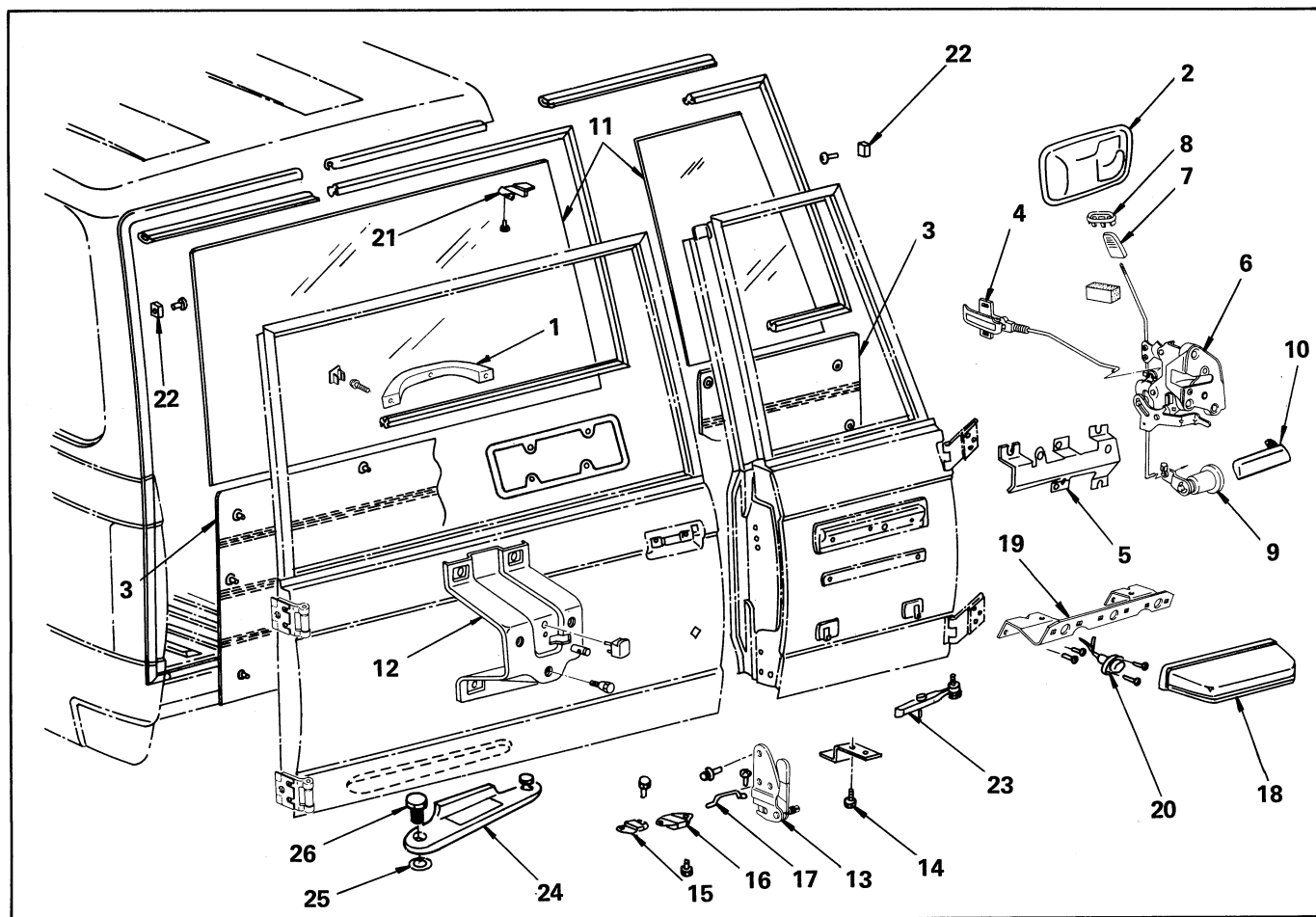
Loosen the striker screws and adjust the position of the striker by holding a piece of wood against the striker and tapping it with a hammer.

To obtain correct adjustment, adjust the position of the striker vertically so that the lower face of the dovetail is parallel with the striker.

Adjust the number of the shims to control the engagement of the striker with the door latch. One or two shims are generally required to obtain correct adjustment.



DISASSEMBLY AND REASSEMBLY



Disassembly steps

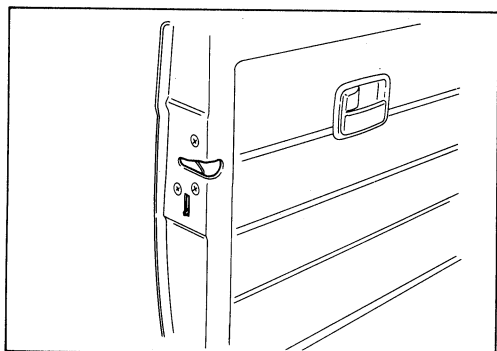
1. Pull handle
2. Bezel
3. Trim pad
4. Inside handle
5. BRKT I/S handle
- ▲ 6. Door lock assembly
7. Knob
8. Escutcheon
- ▲ 9. Door lock cylinder
10. Outside handle
- ▲ 11. Door glass
- ▲ 12. Spare tire carrier
13. Door lock lower assembly and guide
14. Stopper
15. Dovetail lower
16. Dovetail upper
17. Striker lower
18. Licence lamp cover
19. Licence lamp bracket
20. Licence lamp
21. Dovetail striker
22. Dovetail stopper
23. Check arm

Reassembly steps

23. Check arm
22. Dovetail stopper
21. Dovetail striker
20. Licence lamp
19. Licence lamp bracket
18. Licence lamp cover
17. Striker lower
16. Dovetail upper
15. Dovetail lower
14. Stopper
- ▲ 13. Door lock lower assembly and guide
- ▲ 12. Spare tire carrier
- ▲ 11. Door glass
10. Outside handle
- ▲ 9. Door lock cylinder
8. Escutcheon
7. Knob
- ▲ 6. Door lock assembly
5. BRKT I/S handle
4. Inside handle
3. Trim pad
2. Bezel
1. Pull handle

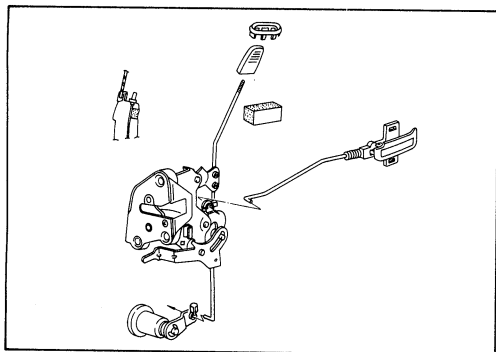


Important operations — Disassembly

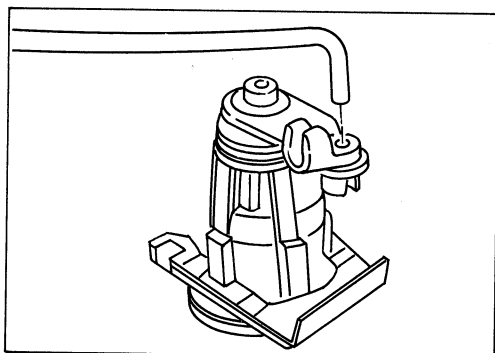


6. Door lock assembly

Remove 3 bolts fixing door lock assembly.



Disconnect the linkage from the door handle, inside lever and lock cylinder.

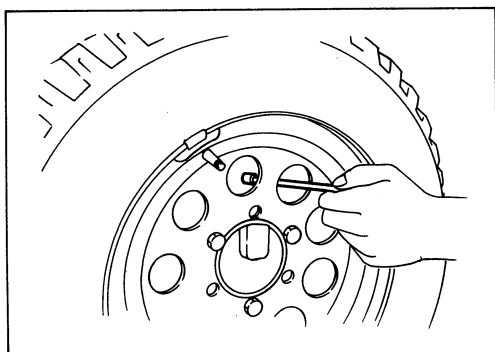


9. Door lock cylinder

Remove the door lock cylinder by applying finger pressure from the inside while depressing the retaining clip.

11. Door glass

Refer to door glass removal procedure.



12. Spare tire carrier

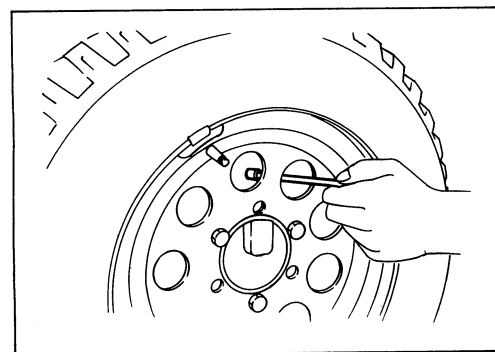
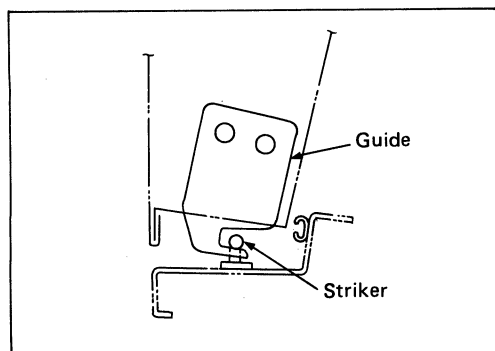
Spare tire carrier nut wrench : J-34355



Important operations — Reassembly

13. Door lock lower assembly and guide

Install the guide so that the claw of the guide is in contact with the striker.

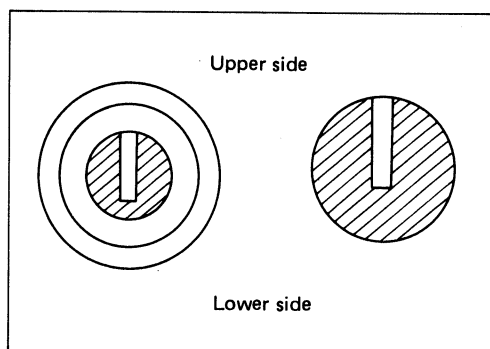


12. Spare tire carrier

Spare tire carrier nut wrench : J-34355

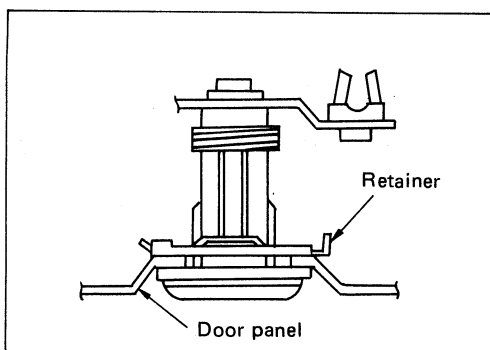
11. Door glass

Refer to door glass installation procedure.

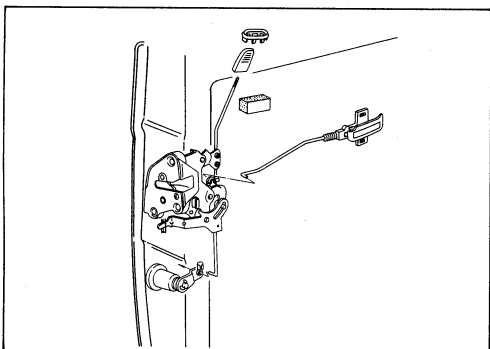


9. Door lock cylinder

Install the door lock cylinder with the correct side up.

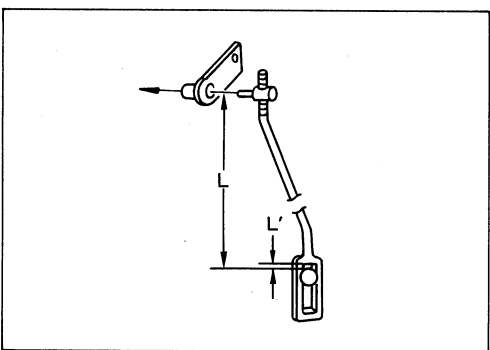


Check that claw portion is fitted properly and that the door lock cylinder does not move.



6. Door lock assembly

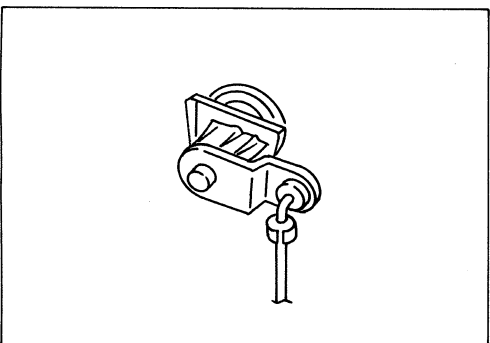
Insert the door lock assembly into position through access hole in the door panel.



Adjust the clearance L' in order to obtain free play of outside handle.

Clearance L'	mm(in.)	0.5 — 1.0 (0.02 — 0.04)
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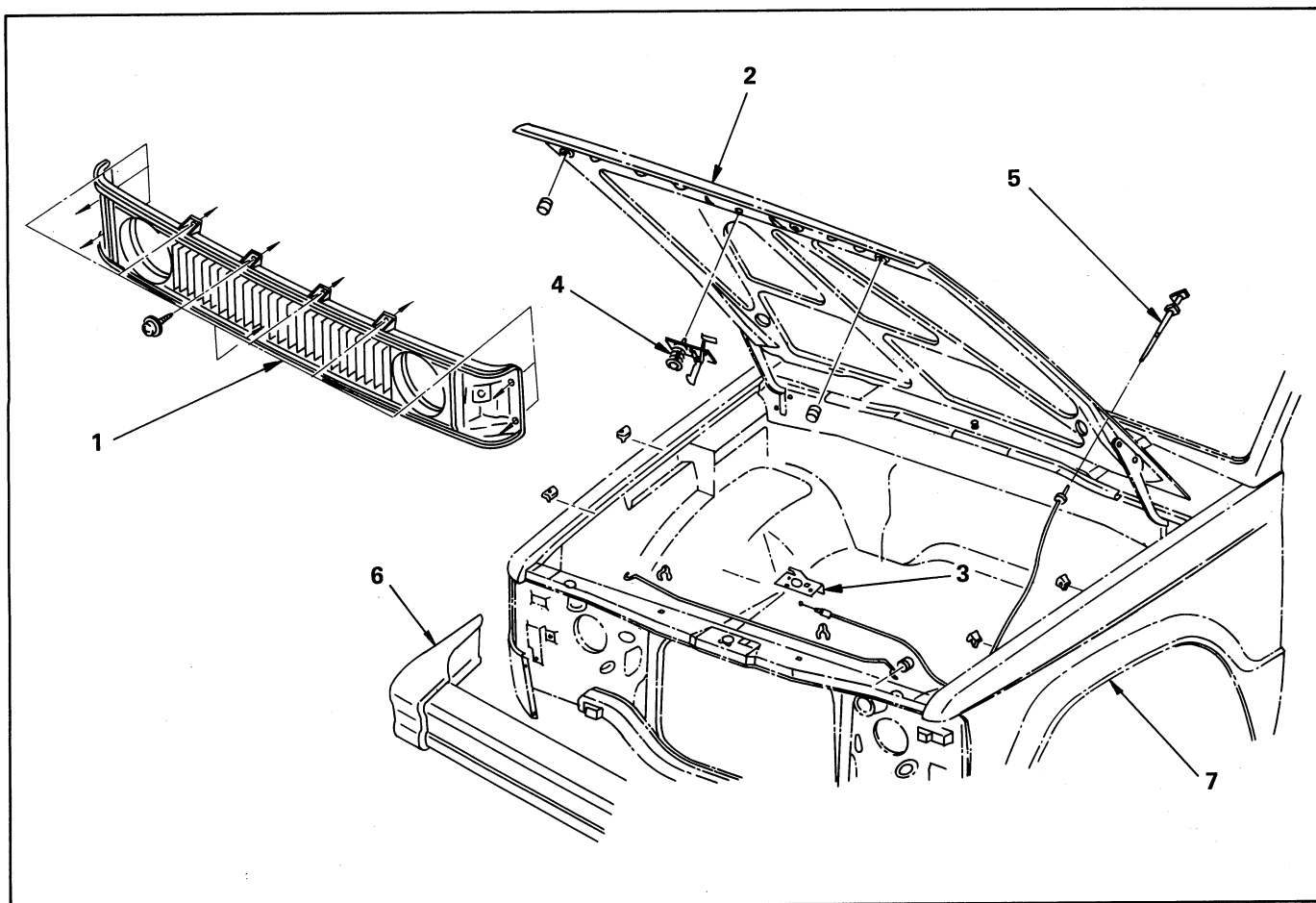
Adjust the height L and then connect with outside handle.



The above value is adequate for the handle when the door lock rod is in the unlocked position.
Play should be 0 (zero) when the door lock rod is locked.

ENGINE HOOD AND FENDER

REMOVAL AND INSTALLATION



Removal steps

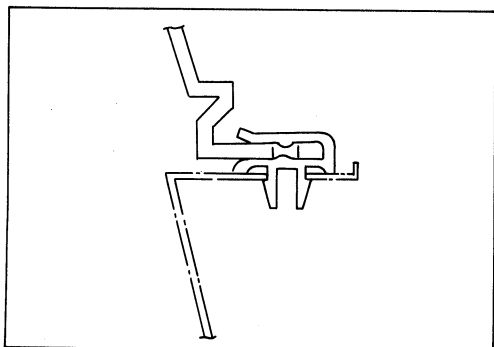
- ▲ 1. Radiator grille
- ▲ 2. Engine hood
- ▲ 3. Lock assembly
- 4. Striker assembly
- ▲ 5. Control cable
- ▲ 6. Front bumper assembly
- ▲ 7. Front fenders

Installation steps

- 7. Front fenders
- ▲ 6. Front bumper assembly
- 5. Control cable
- 4. Striker assembly
- 3. Lock assembly
- 2. Engine hood
- ▲ 1. Radiator grille

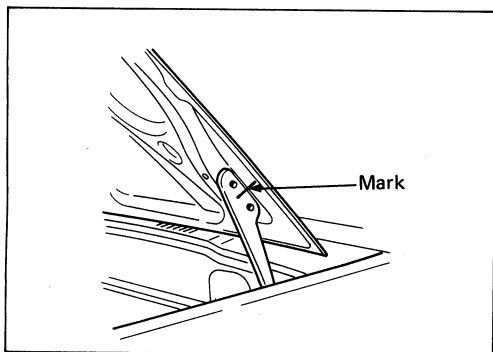


Important operations — Removal



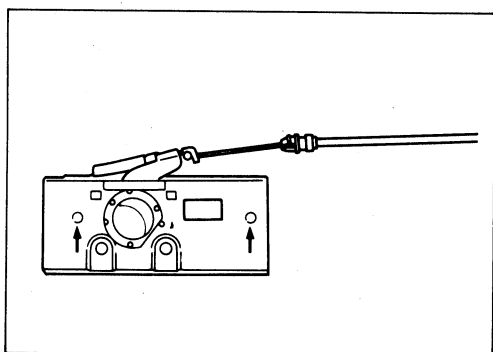
1. Radiator grille

1. First loosen and remove the nine screws attaching the radiator to the body.
2. Then, remove the two clips and the radiator grill assembly.



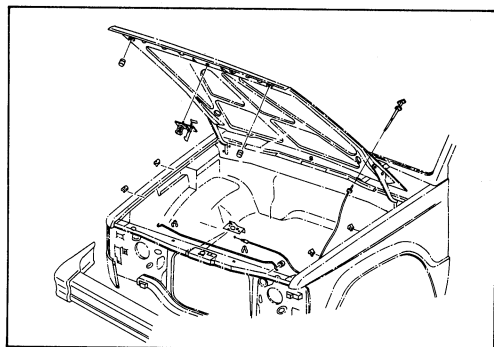
2. Engine hood

Before removing the hinges from the engine hood, scribe a mark showing the location of the hinges with the aid of an assistant to facilitate installation in the original position.



3. Lock assembly

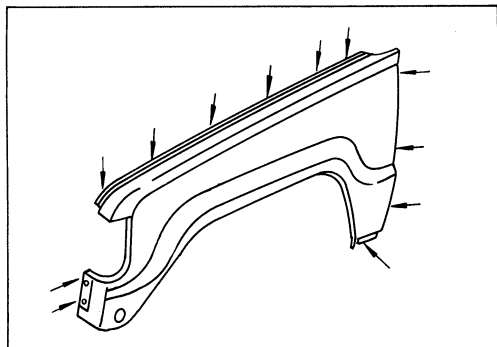
Remove the two screws fixing the hood latch, then remove the hood latch.



5. Control cable

- Disconnect the inner cable end from the slot in the hood latch.
- Remove the cable from the clips on the fender skirt.
- Depress the grommet on the dash panel in toward the cab.
- Pull out the engine hood control cable toward the cab.

Refer to front bumper removal procedure.



6. Front bumper assembly

7. Front fenders

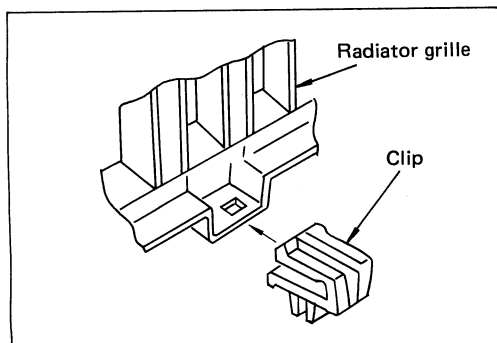
1. Remove the two rubbers from upper frange of front fender.
2. Remove the bolt and nut fixing the front side bumper belt to front fender.
3. Remove the screw type rivets and bolts, 5 of them fixing the fender inner liner by turning them counterclockwise.
4. Remove the inner liner from the fender by disengaging a total of 5 clips located at the edge of the fender, while pulling the fender inner liner inward.
5. Remove the bolts fixing the front fender in the following sequence.
 - 1) Remove the two bolts fastening front fender with front fairing panel.
 - 2) Remove the bolt fastening from fender with rocker panel.
 - 3) Open the door and remove the three bolts on the hinge pillar.
 - 4) Remove the six front fender to fender skirt bolts.
6. Remove the front fender.
7. To install, reverse the procedure of removal.



Important operation — Installation

6. Front bumper assembly

Refer to front bumper installation procedure.

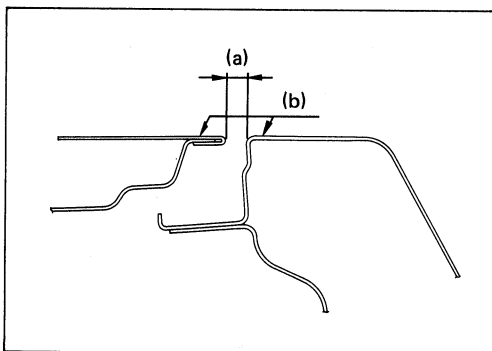
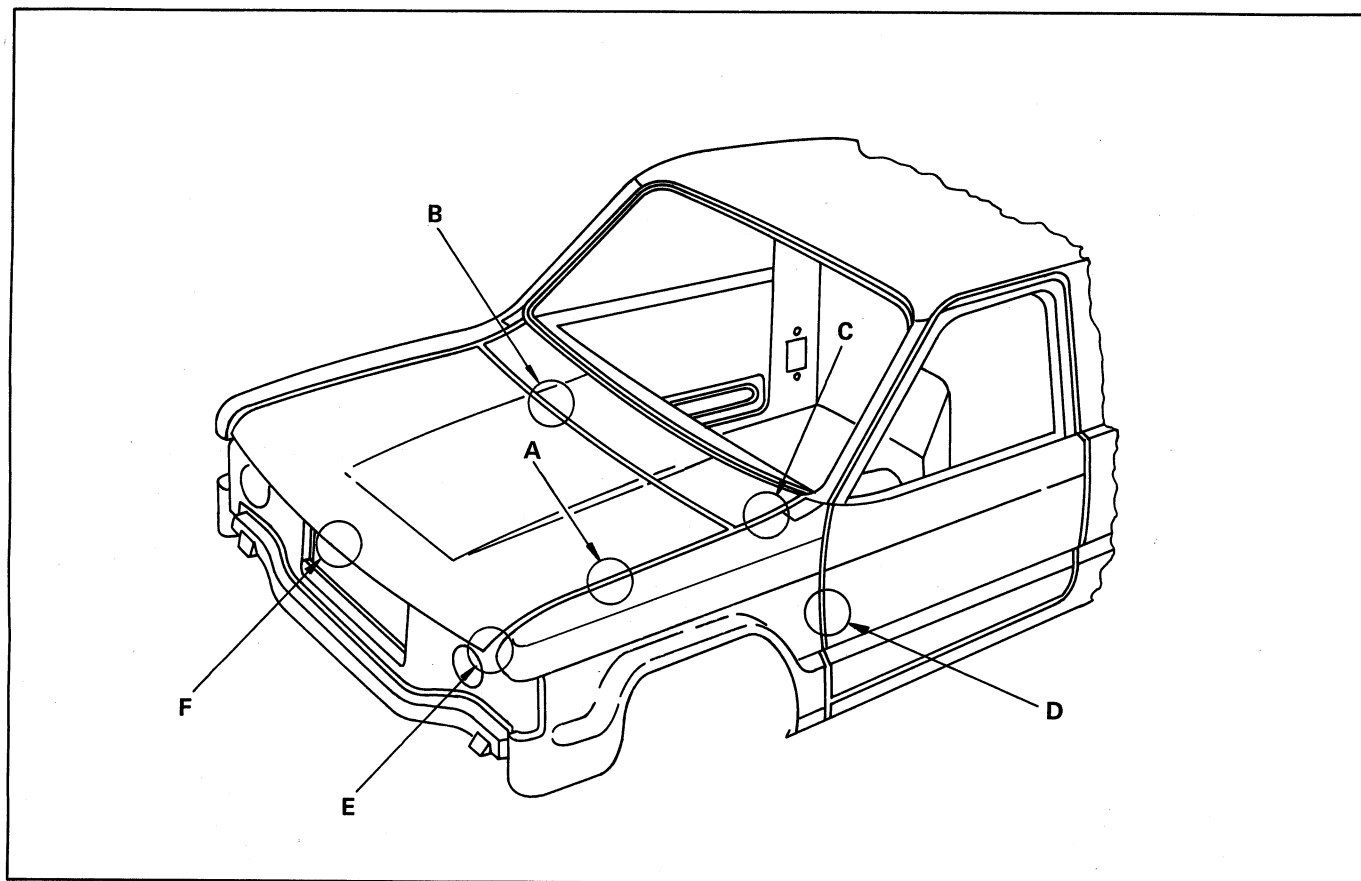


1. Radiator grille

Set the two clips on the radiator grill assembly and then place the assembly on the front panel. Insert and tighten the nine screws which hold the radiator grill assembly to the body.

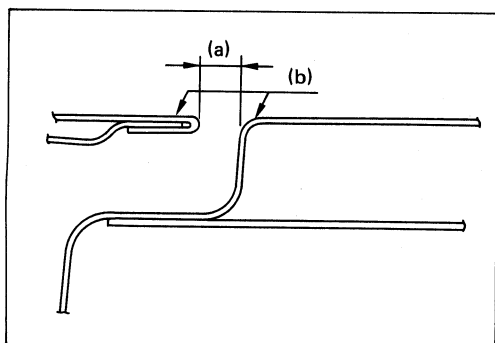


ADJUSTMENT

**A. Check the engine food and fender**

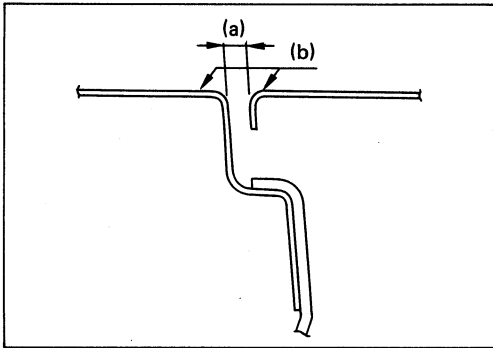
mm(in.)	
Clearance (a)	6.5 (0.256)
Height (b)	Flush

Adjust the clearance (a) with the hinges on the engine hood.
Adjust the step (b) with the hood rests.

**B. Check the engine hood and upper cowl.**

mm(in.)	
Clearance (a)	6.5 (0.256)
Height (b)	Flush

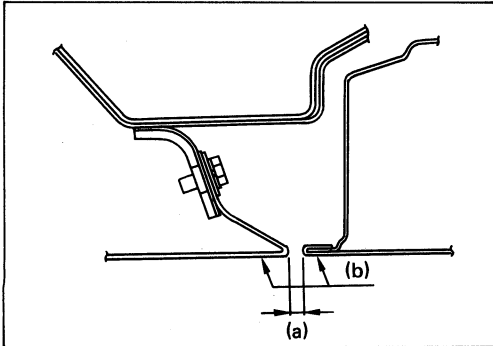
Adjust the clearance (a) with the hinges on the engine hood.
Adjust the step (b) with the hood rests.



C. Check the upper cowl and fender.

	mm(in.)
Clearance (a)	3.4 (0.134)
Height (b)	Flush

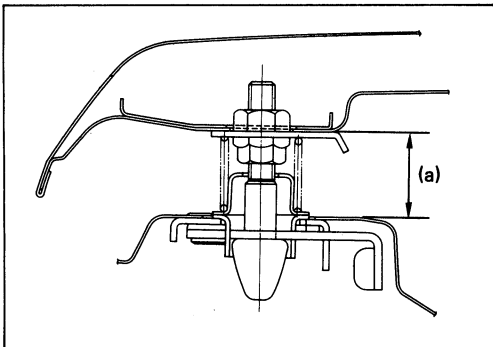
Adjust the step (b) with the fender shims or by tapping on the hood lightly with a rubber hammer.



D. Check the fender and door.

	mm(in.)
Clearance (a)	6.4 (0.252)
Height (b)	Flush

Adjust the clearance (a) with the door hinges.
Adjust the step (b) by tapping on the fender lightly with a rubber hammer.



E. Check the engine hood and radiator support

	mm(in.)
Clearance (a)	30 (1.182)

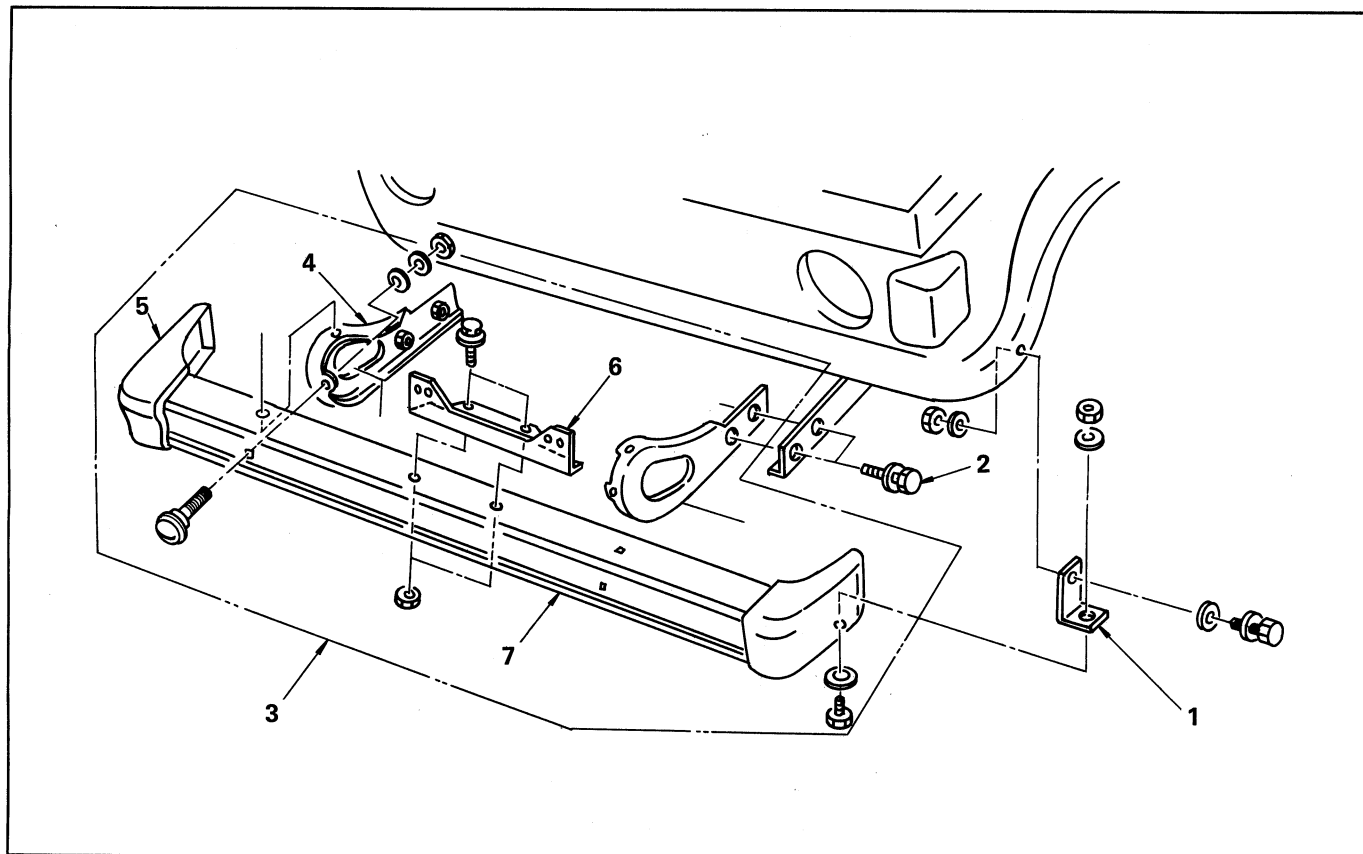
Adjust the clearance (a) with the hood striker adjust bolt.

FRONT AND REAR BUMPER



REMOVAL AND INSTALLATION

FRONT BUMPER

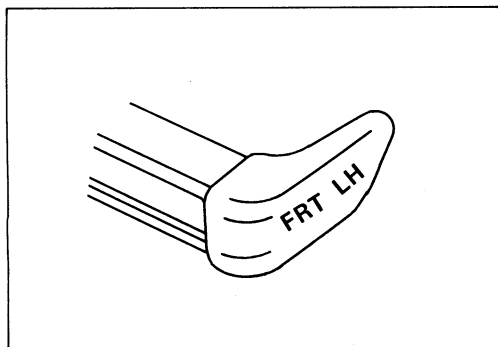


Removal steps

1. Belt
2. Bolt
3. Front bumper assembly
4. Back bar
5. Bumper side
6. License plate bracket
7. Bumper

Installation steps

7. Bumper
6. License plate bracket
- ▲ 5. Bumper side
- ▲ 4. Back bar
3. Front bumper assembly
- ▲ 2. Bolt
1. Stay

**Important operations — Installation****5. Bumper side**

Note the emboss mark (FRT LH, FRT RH) stamped on the inner face.



Bolt torque	kg-m(ft.lbs.)	1.2 — 2.0 (8.7 — 14.4)
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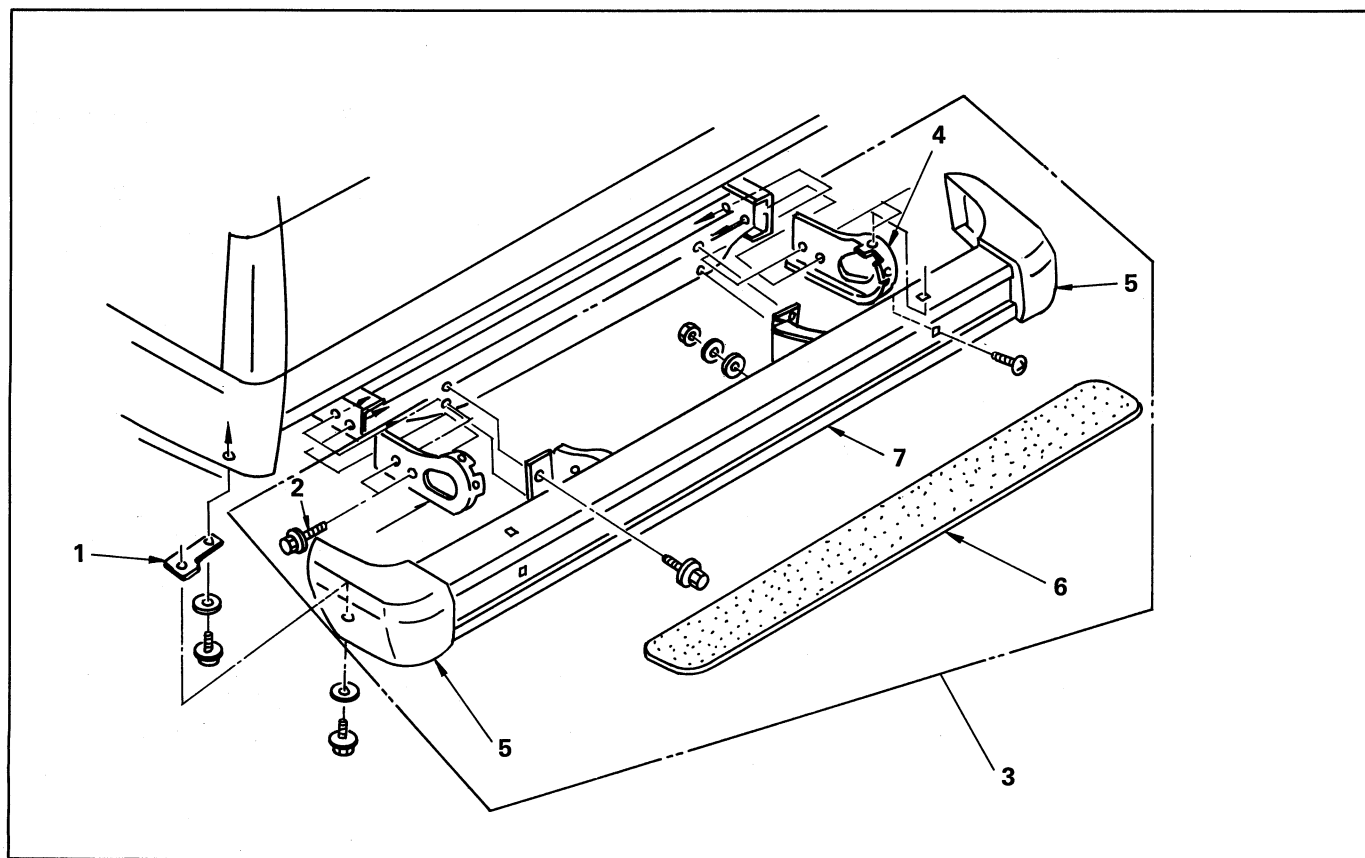
**4. Back bar**

Bolt torque	kg-m(ft.lbs.)	5.0 — 6.0 (36 — 43)
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**2. Bolt**

Torque	kg-m(ft.lbs.)	2.5 — 3.0 (18 — 22)
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REAR BUMPER

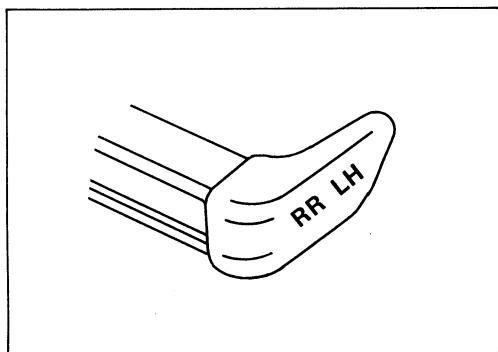


Removal steps

1. Stay
2. Bolt
3. Rear bumper assembly
4. Back bar
5. Bumper side
6. Non slip sheet
7. Bumper

Installation steps

7. Bumper
6. Non slip sheet
- ▲ 5. Bumper side
- ▲ 4. Back bar
3. Rear bumper assembly
- ▲ 2. Bolt
1. Stay

**Important operations — Installation****5. Bumper side**

Note the emboss mark (RR RH, RR LH) stamped on the inner face.



Bolt torque	kg-m(ft.lbs.)	1.2 — 2.0 (8.7 — 14.4)
-------------	---------------	------------------------

**4. Back bar**

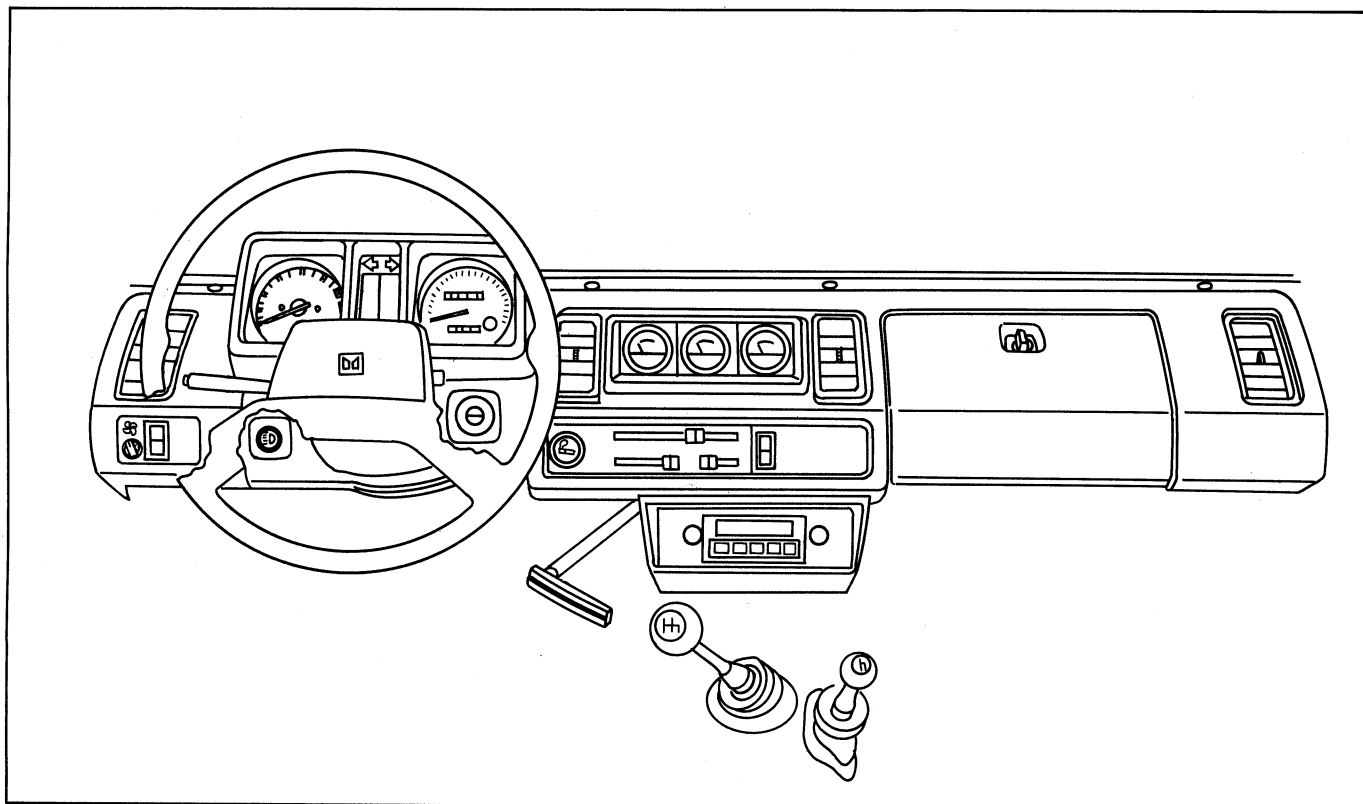
Bolt torque	kg-m(ft.lbs.)	5.0 — 6.0 (36 — 43)
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**2. Bolt**

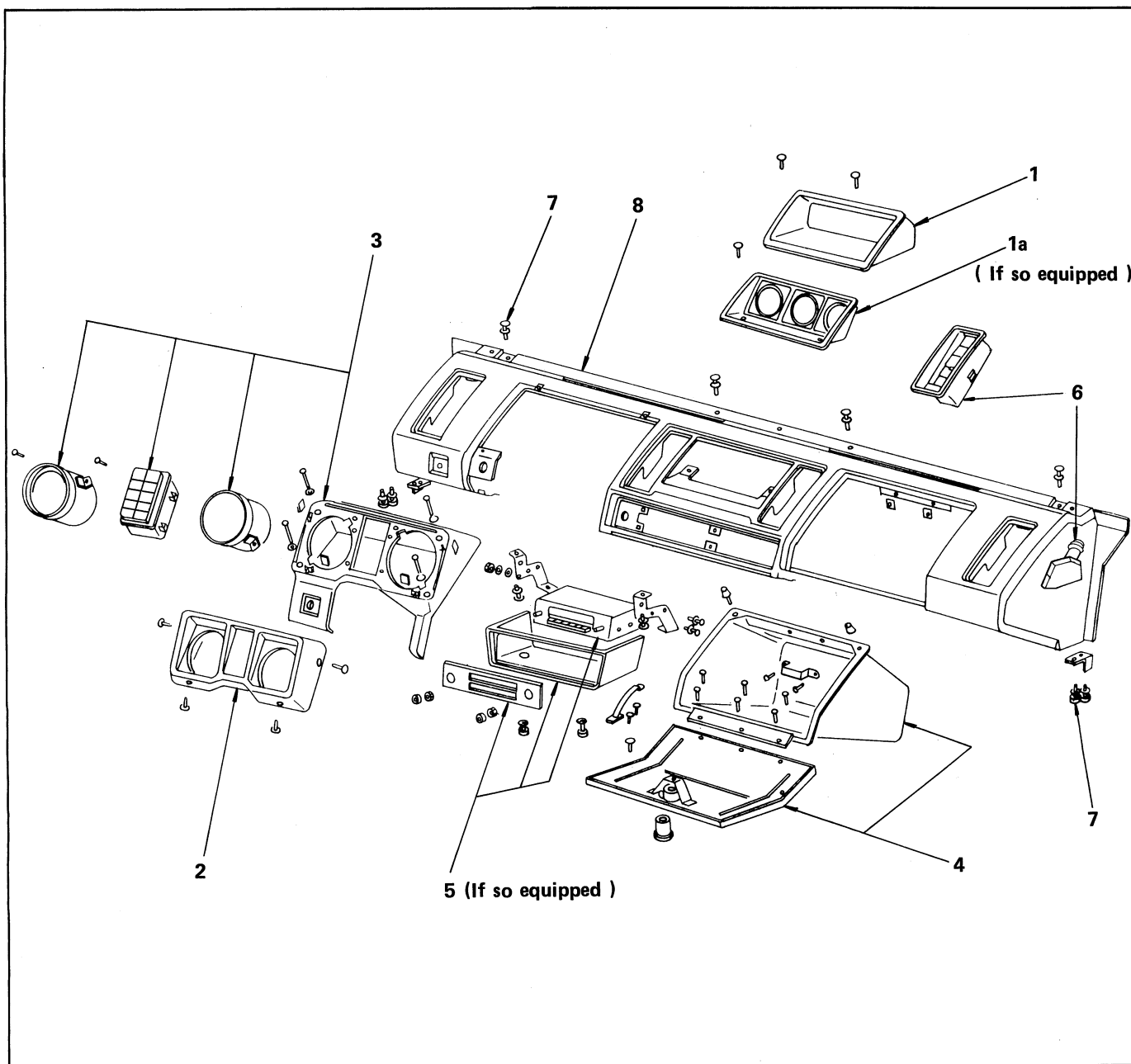
Torque	kg-m(ft.lbs.)	2.5 — 3.0 (18 — 22)
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INSTRUMENT PANEL

GENERAL DESCRIPTION



↔ ↔ REMOVAL AND INSTALLATION



Removal steps

1. Parcel tray
- 1a. Combination gauges (If so equipped)
- ▲ 2. Meter hood
- ▲ 3. Meter assembly
4. Glove compartment
5. Radio (If so equipped)
- ▲ 6. Duct side ventilator and side defroster grill
7. Bolt (8 pieces)
- ▲ 8. Instrument panel

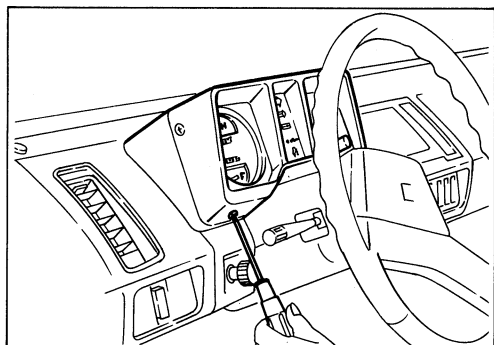
Installation steps

- ▲ 8. Instrument panel
7. Bolt (8 pieces)
- ▲ 6. Duct side ventilator and side defroster grill
5. Radio (If so equipped)
4. Glove compartment
- ▲ 3. Meter assembly
2. Meter hood
- 1a. Combination gauges (If so equipped)
1. Parcel tray



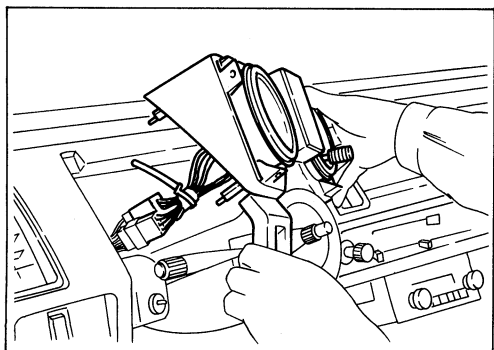
Important operations — Removal

2. Meter hood



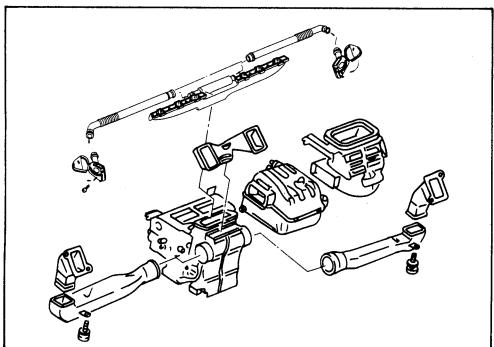
3. Meter assembly

Before removing, disconnect the speedometer cable and harnesses at the connector.



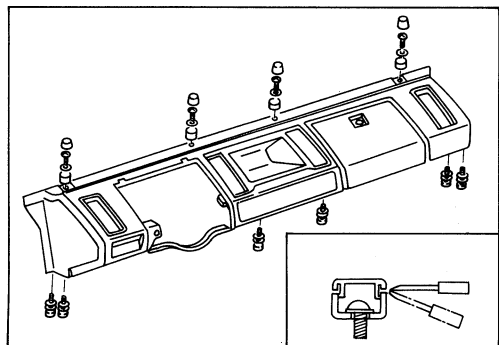
6. Side ventilator

Turn the grille as illustrated, then remove the side ventilator using a screw driver.



8. Instrument panel

Remove the six bolts from the inside of the instrument panel.

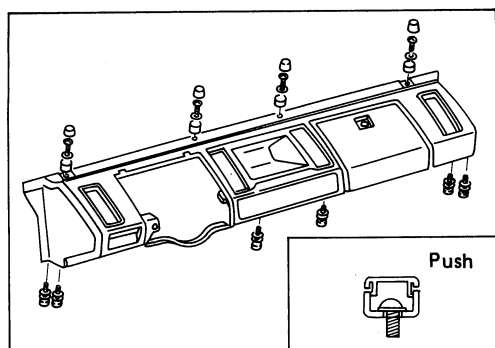




Important operations — Installation

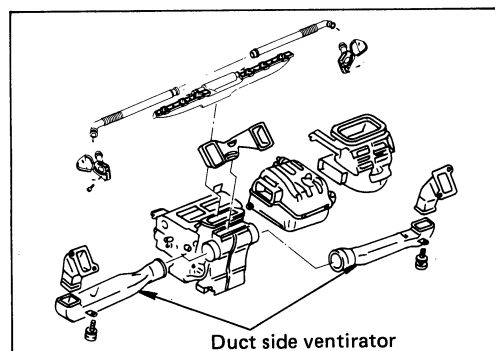
8. Instrument panel

Install the six bolts from the inside of the instrument panel.



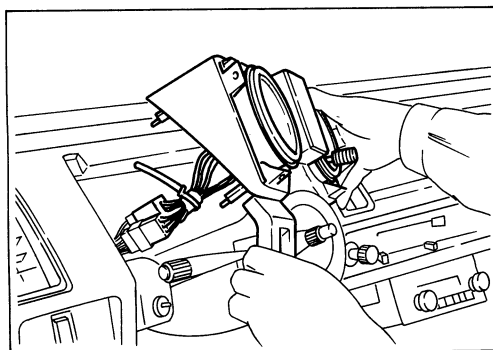
6. Duct, side ventilator

Turn the grill as illustrated, then install the ventilator.



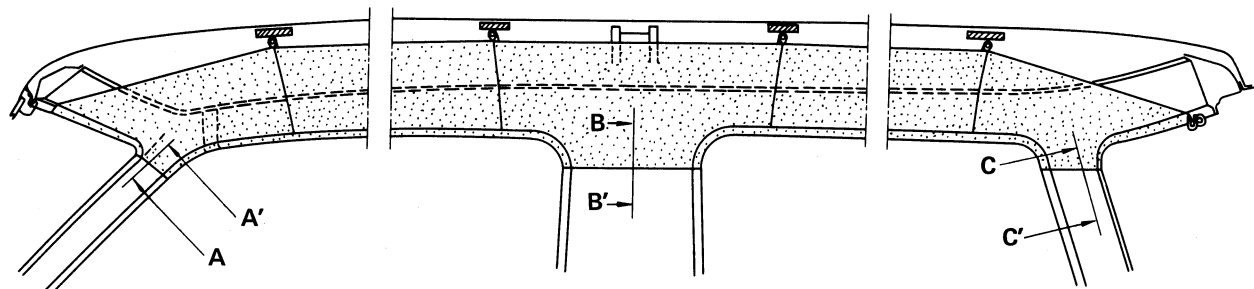
3. Meter assembly

Before installing, connect the speedometer cable and harnesses at the connector.

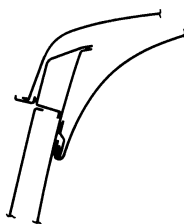


HEADLINING

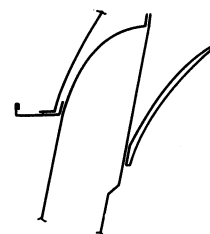
GENERAL DESCRIPTION



A - A' Section



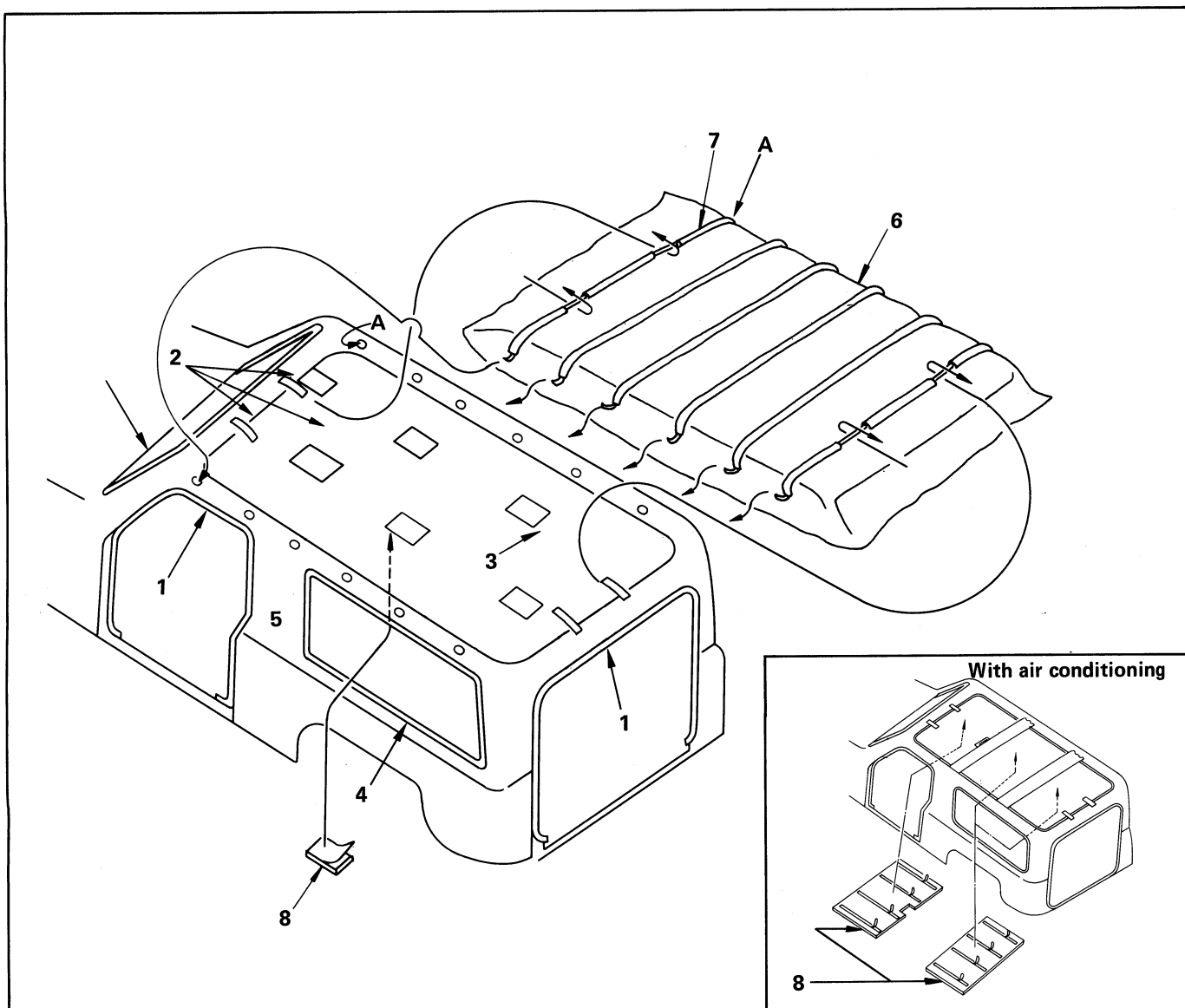
B - B' Section



C - C' Section



REMOVAL AND INSTALLATION



Removal steps

1. Front and back door finishers
2. Rear view mirror, sun visor and dome lamp assembly
- ▲ 3. Windshield and side window
- ▲ 4. Leather hook
- ▲ 5. Headlining
- ▲ 6. Listing wire
7. Insulation pad
8. Double adhesion tape

Installation steps

- ▲ 8. Double adhesion tape
- ▲ 7. Insulation pad
- ▲ 6. Listing wire
- ▲ 5. Headlining
- ▲ 4. Leather hook
- ▲ 3. Windshield and side window
2. Rear view mirror, sun visor and dome lamp assembly
- ▲ 1. Front and back door finishers



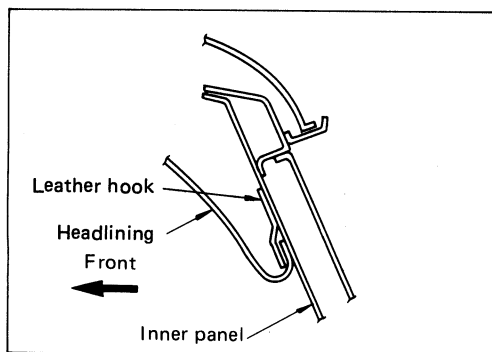
Important operations — Removal

3. Windshield and side window

Refer to windshield and side window removal procedure.

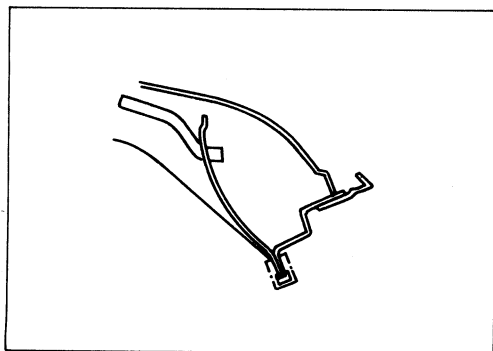
4. Leather hook

Spread the leather hook using a screw driver.



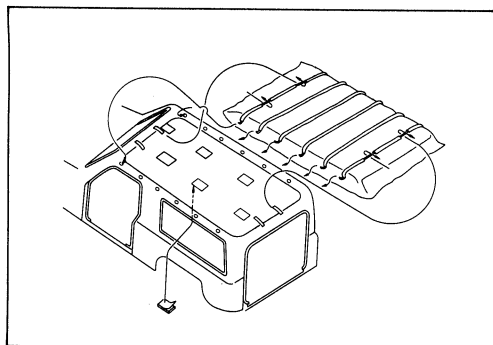
5. Headlining

Remove the headlining from the retainer.



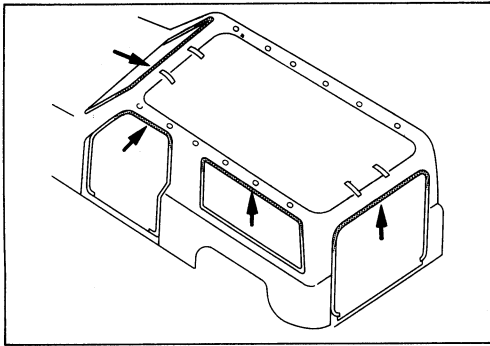
6. Listing wire

Remove the listing wires from the cantrail closing.



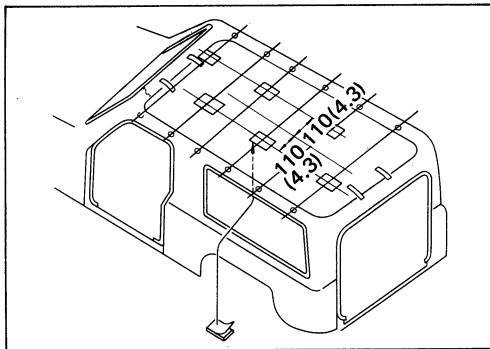


Important operations — Installation



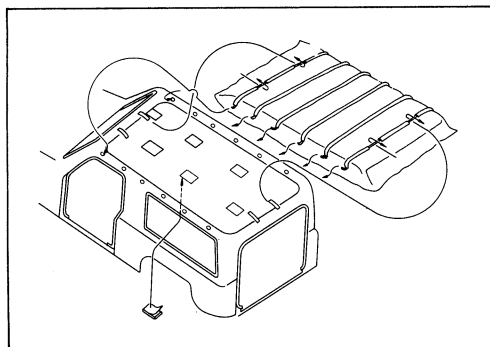
8. Double adhesion tape

- Wipe off old adhesive and dirt from the body.
- Place the new double adhesion tape on the outer face of body flange.



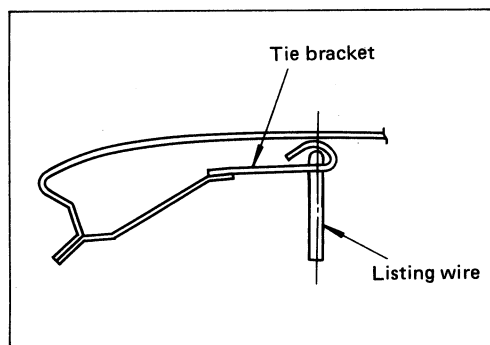
7. Insulation pad

- Wipe off old adhesive and dirt from the body.
- Apply liquid adhesive to the body side of insulation pad.
- Bond the insulation pad to the roof as illustrated positions.
Bonding positions (between vehicle center and insulation pad center) : 110 mm (4.3 in.).

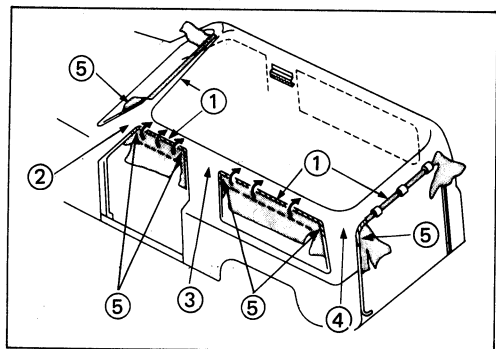


6. Listing wire

Insert the listing wire to the fitting hole on body.

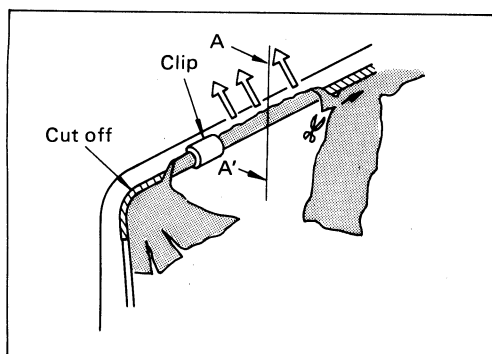


Fix the listing wire with the tie bracket as illustrated.



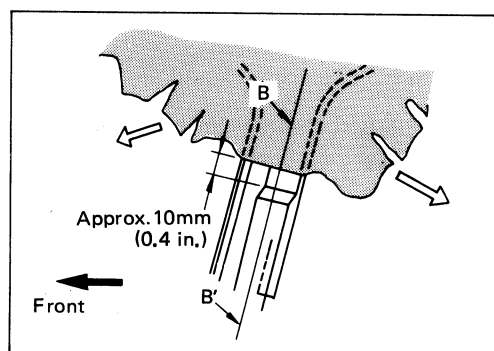
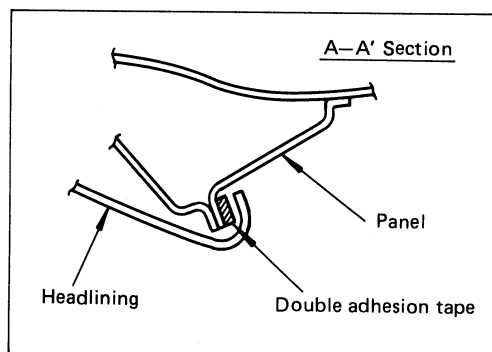
5. Headlining

- Fix the headlining to the double adhesion tape so as not to crease or put tension on the headlining.
- Cut off the excess portions of the headlining.

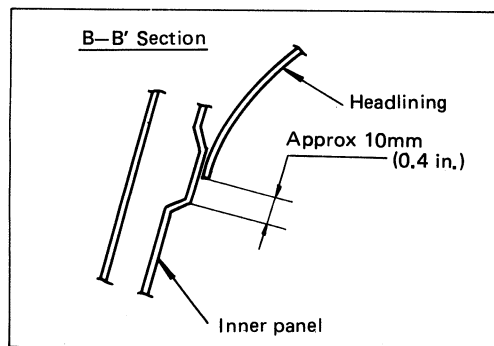


① Back door portion

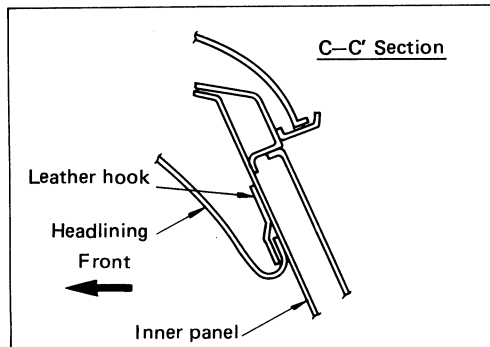
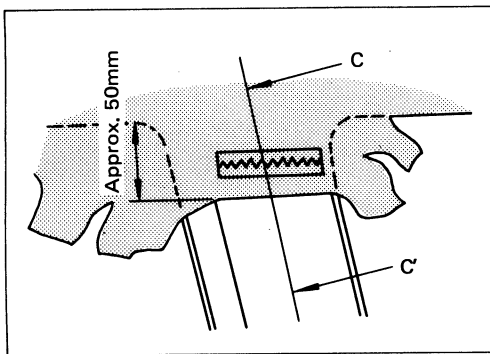
- Cut off the excess portions of the headlining and then fix them with clip.
- Do the same with the portions of windshield, front door and side window.



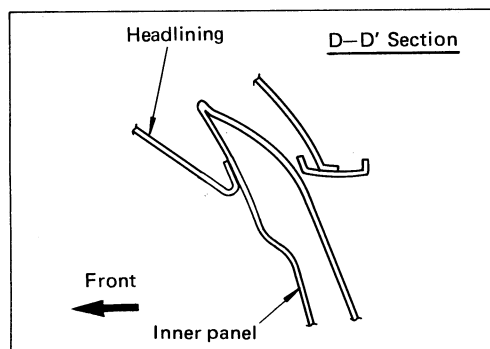
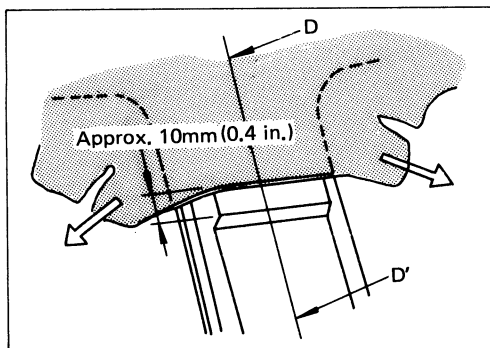
② A post portions

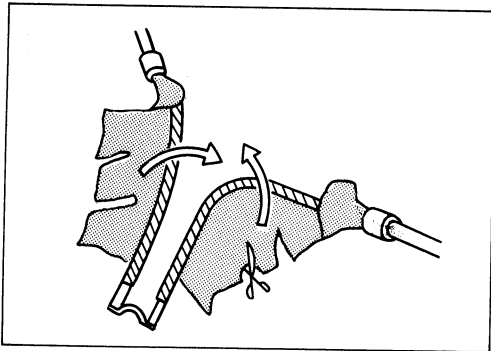


③ B post portions



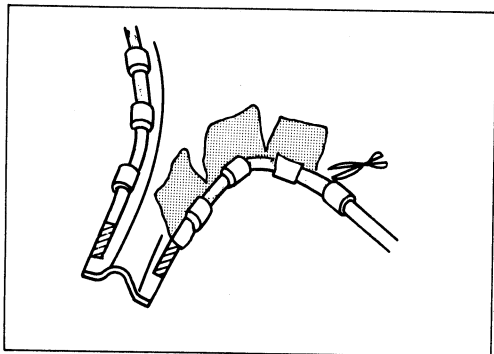
④ Rear pillar portions





4. Corner portions

Cut off the excess portions of headlining and then fix with clip as illustrated.

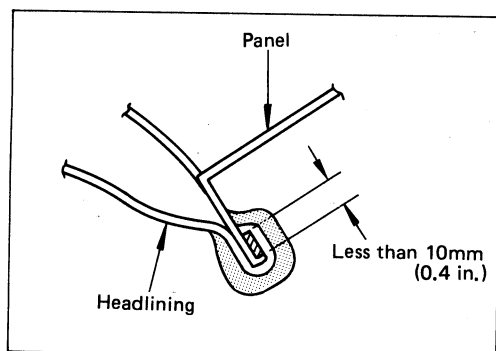


Refer to windshield and side window installation procedure.

3. Windshield and side window

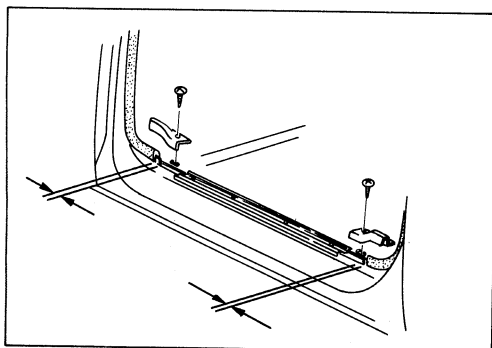
1. Front and back door finishers

Cut off the headlining so as not to come out from the weather strip or finisher.



Front door windlace

Standard	mm(in.)	5 (0.197)
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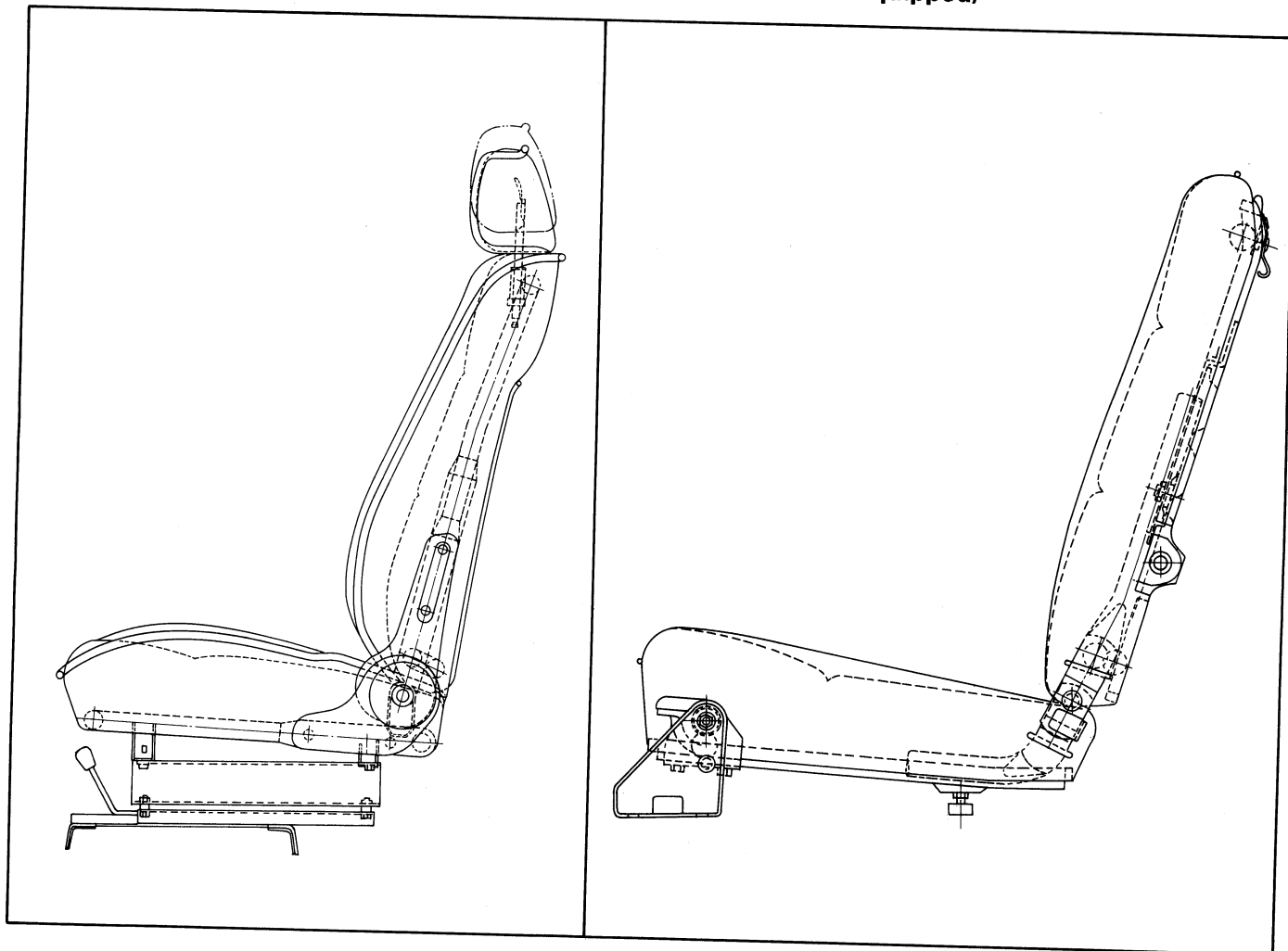


SEATS

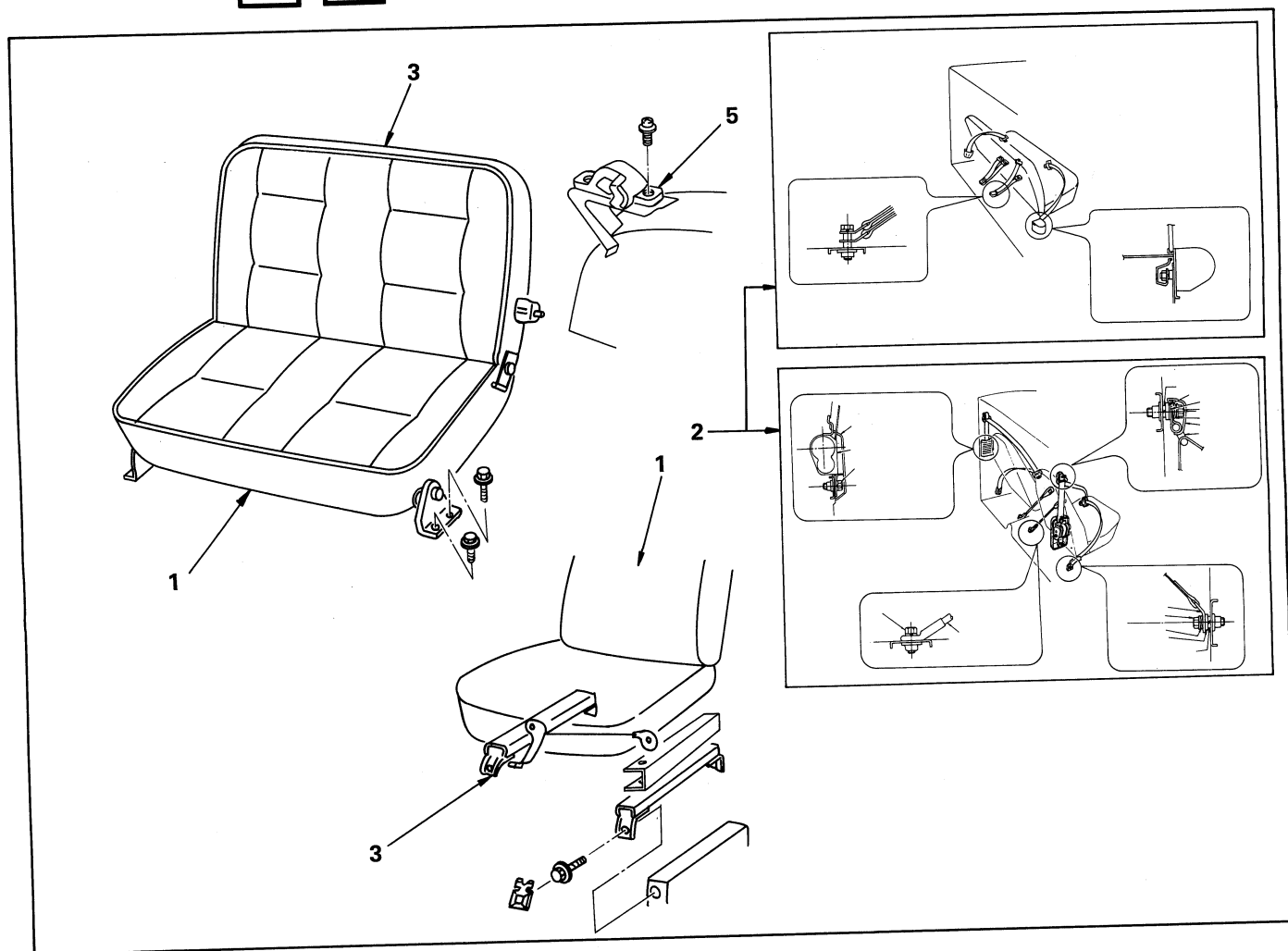
GENERAL DESCRIPTION

Front seat

Rear seat (If so equipped)



REMOVAL AND INSTALLATION



Removal steps

- ▲ 1. Seat adjuster assembly (Front seat only)
- 2. Seat assembly
- ▲ 3. Seat back assembly
- 4. Seat belts
- 5. Catcher (Rear seat)

Installation steps

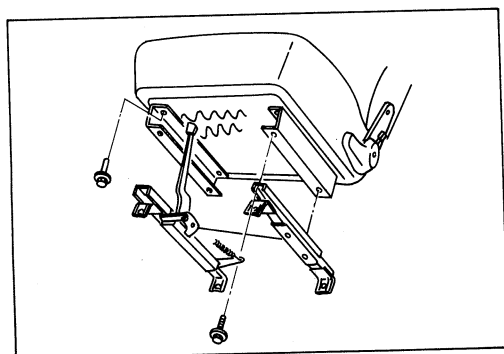
- 5. Catcher (Rear seat)
- ▲ 4. Seat belts
- ▲ 3. Seat back assembly
- ▲ 2. Seat assembly
- 1. Seat adjuster assembly (Front seat only)

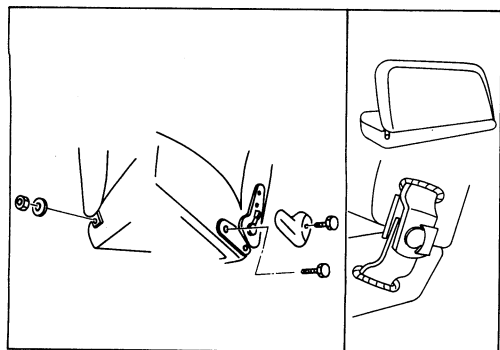


Important operations — Removal

1. Seat adjuster assembly (Front seat only)

Remove both the front and rear adjuster to seat frame attaching bolts and remove the adjusters from the seat frame.





3. Seat back assembly

Front seat back; Install bolts (4), nut washer and cover with screw.

Rear seat back; remove the plastic washers and the hinge pins, then remove the seat back.



Important operations — Installation

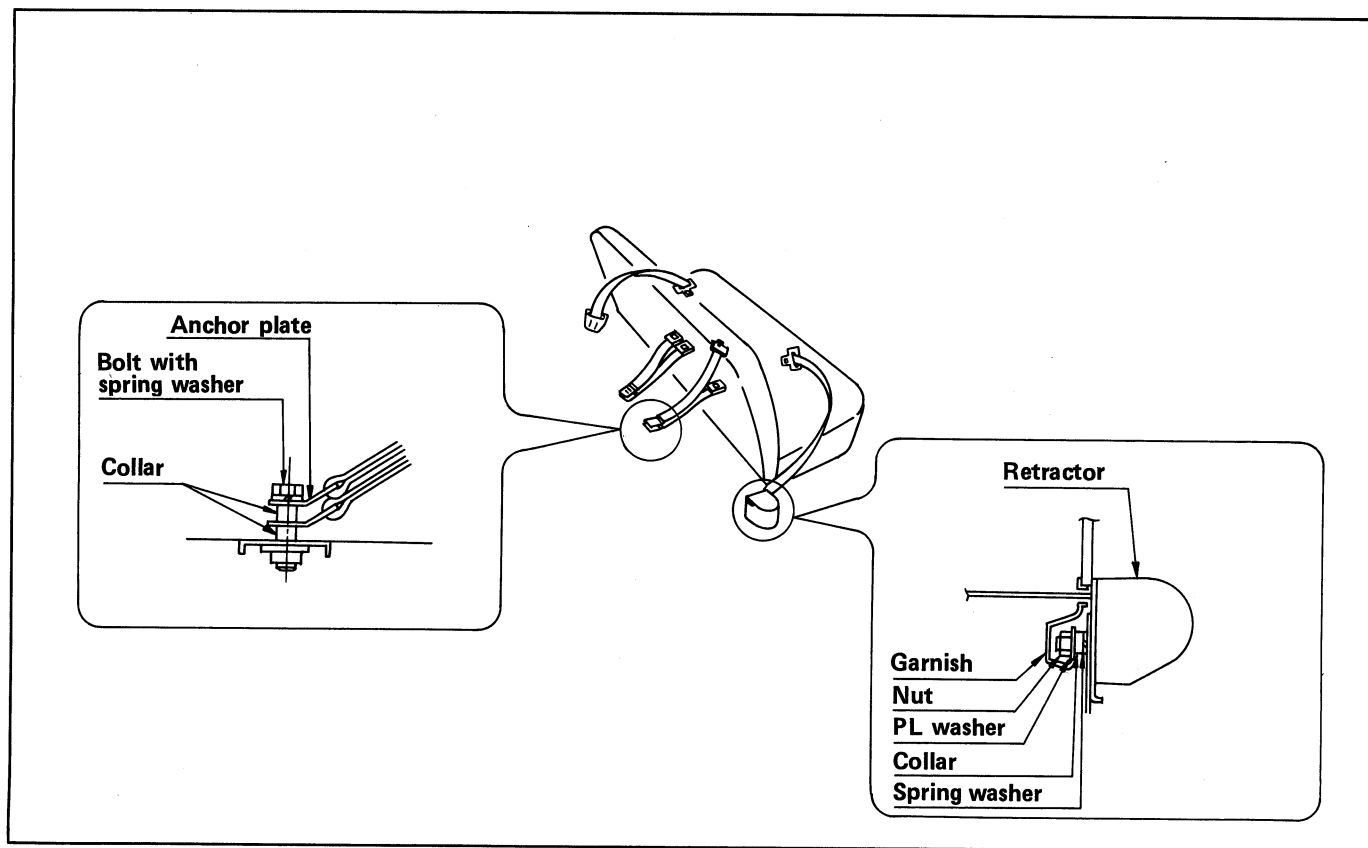


4. Seat belts

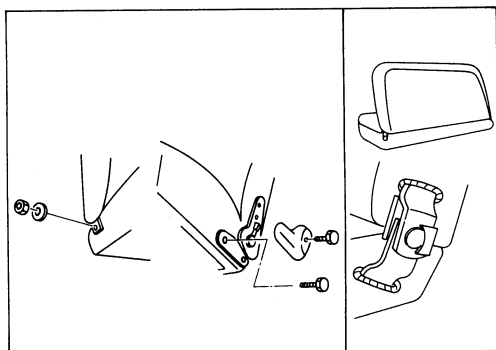
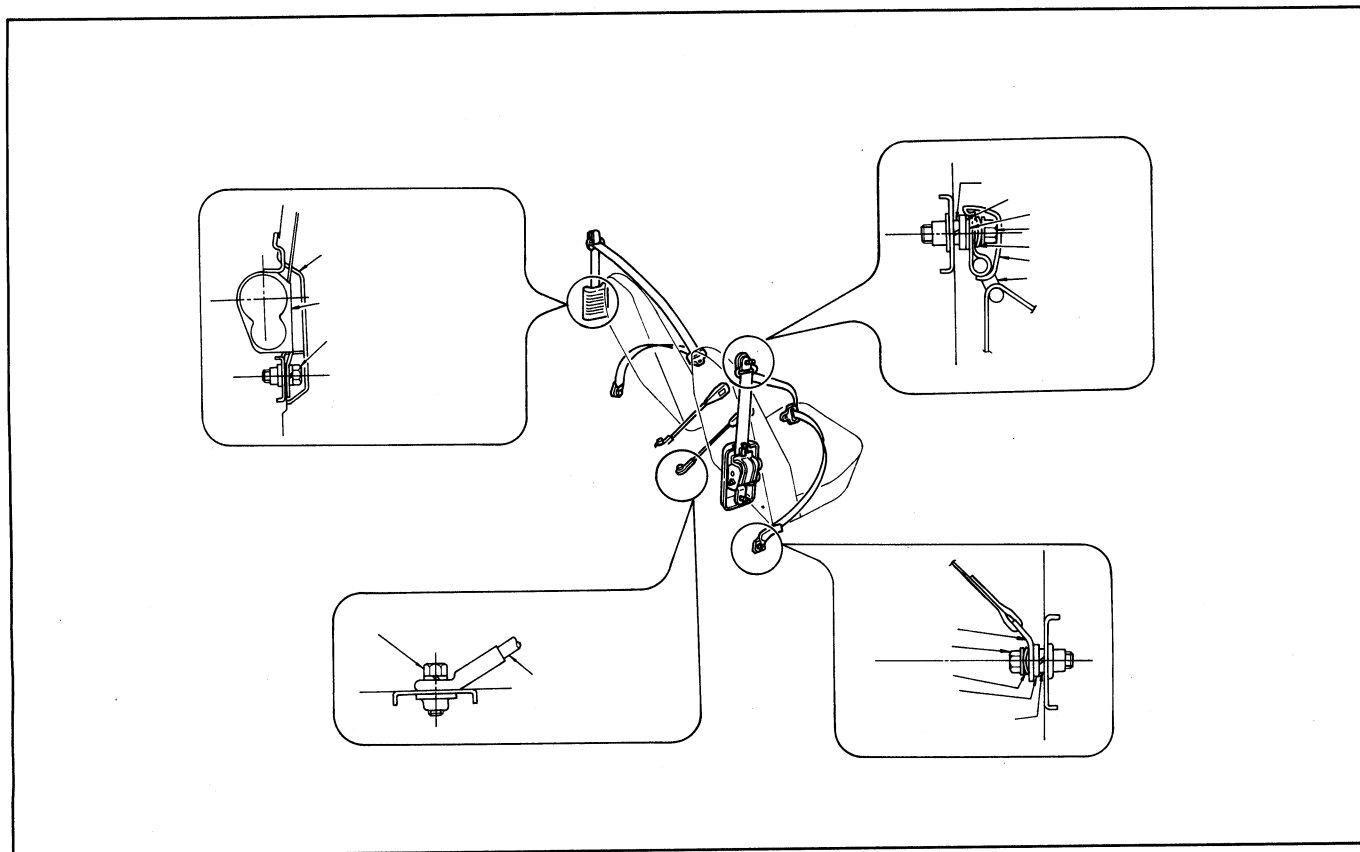
Install the seat belt and tighten the anchor bolts.

Torque	kg-m(ft.lbs.)	3.0 — 5.0 (22 — 49)
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Rear seat belts

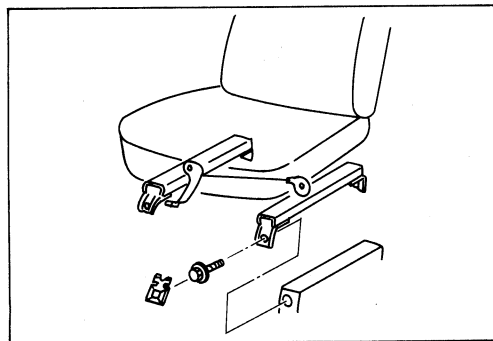


Front seat belts

**3. Seat back assembly**

Front seat back; Install bolts (4), nut washer and cover with screw.

Rear seat back; Install the seat back and the hinge pins.

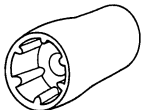
**2. Seat adjuster assembly**

Seat adjuster to seat frame attaching bolts must be replaced with the ones of the same part number or equivalent part if replacement becomes necessary.

Do not use replacement parts of lesser quality or other design.

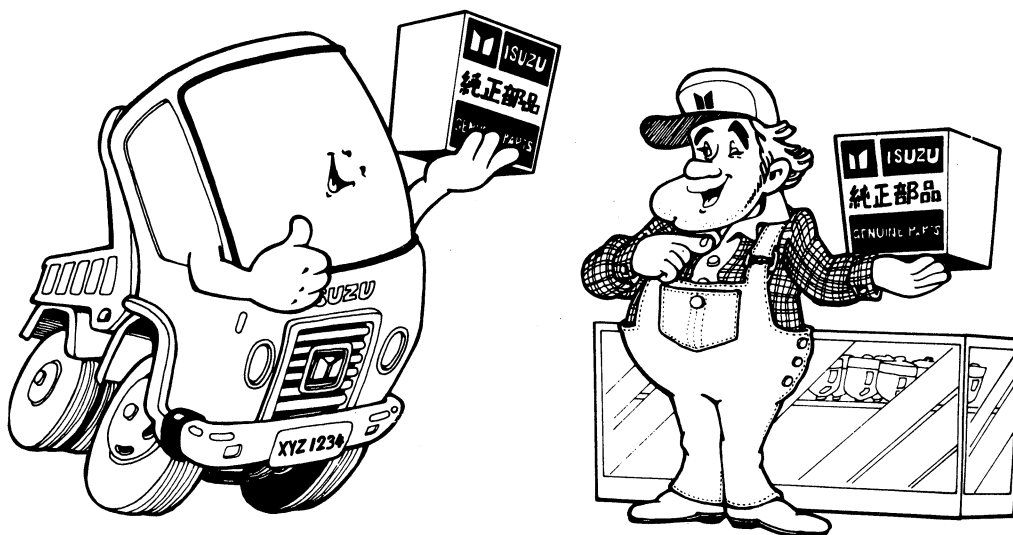
Torque	kg-m(ft.lbs.)	1.1 — 1.5 (7.9 — 10.8)
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SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-34355	Spare tire carrier nut wrench

MEMO

"QUALITY PARTS YOU CAN TRUST"



SECTION 12

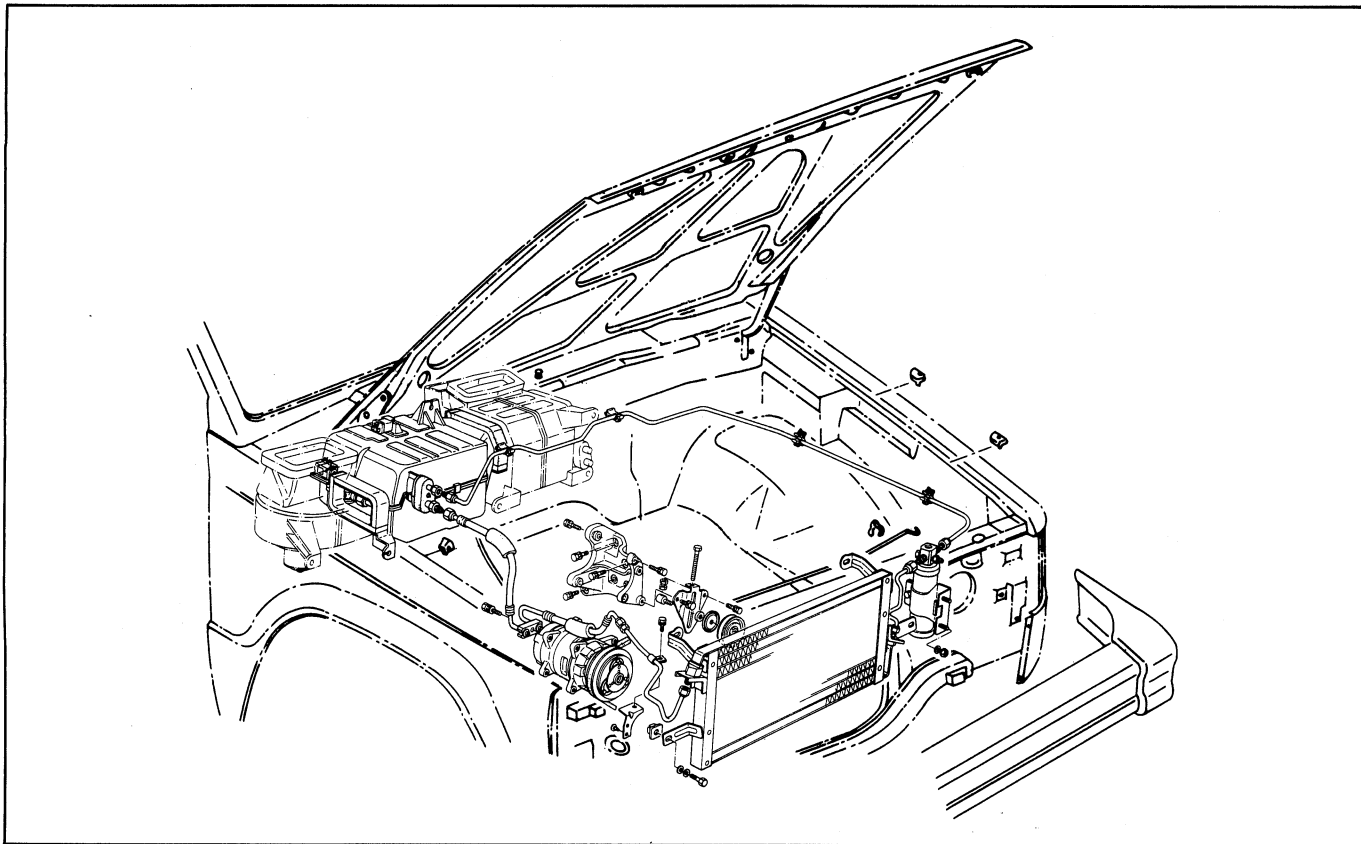
HEATER AND AIR CONDITIONING

INDEX

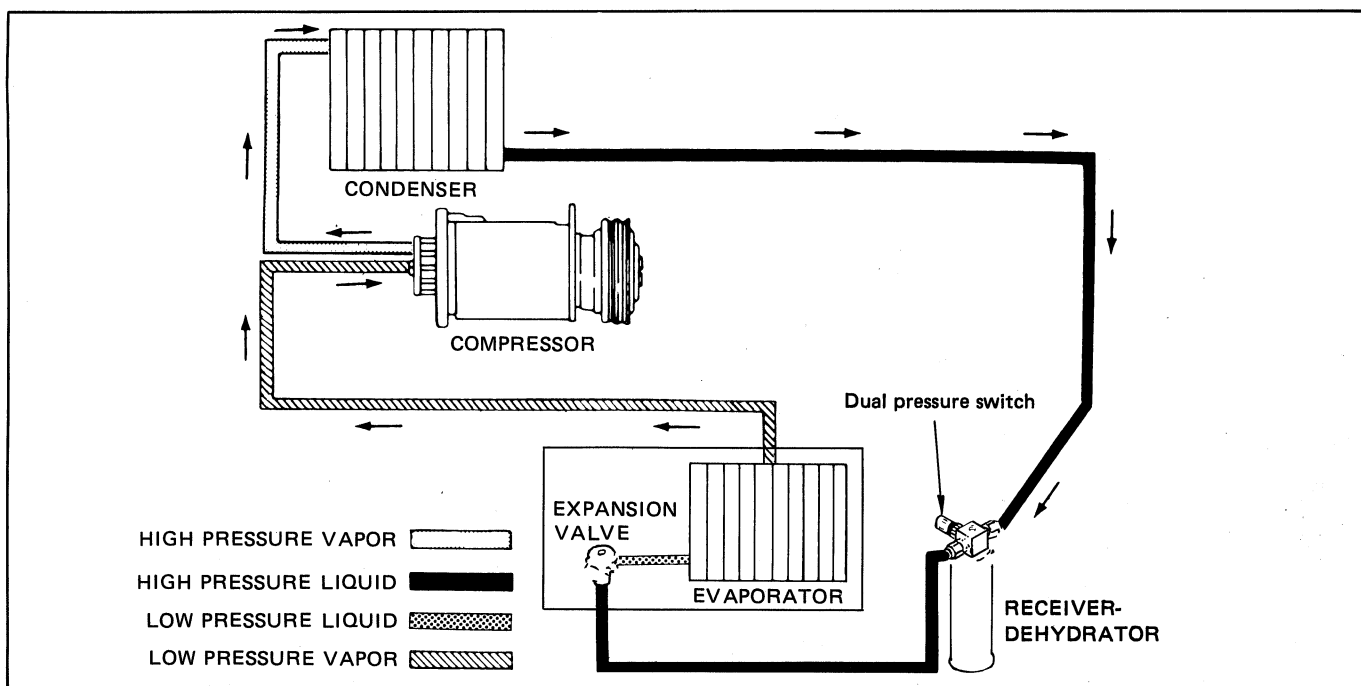
CONTENTS	PAGE
General description	12- 2
Main data and specifications	12- 6
Major parts ; fixing nuts and bolts	12- 7
Air conditioning refrigeration system	12- 9
Compressor	12-14
Heater unit, evaporator assembly and blower unit	12-21
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Diagnosis	12-31
Special tools	12-35

GENERAL DESCRIPTION

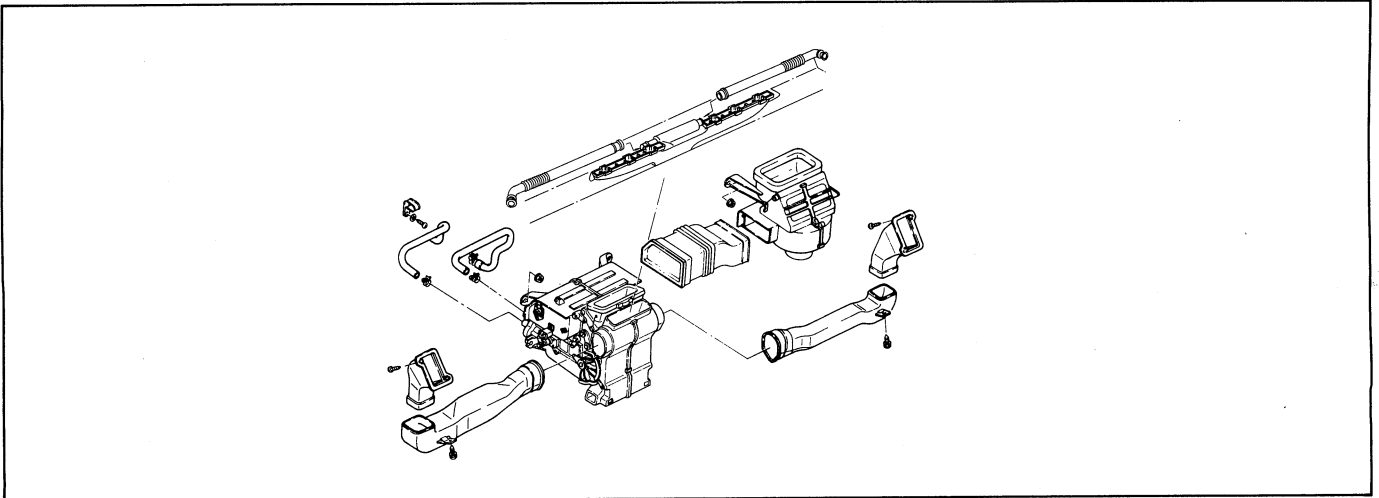
SYSTEM COMPONENTS



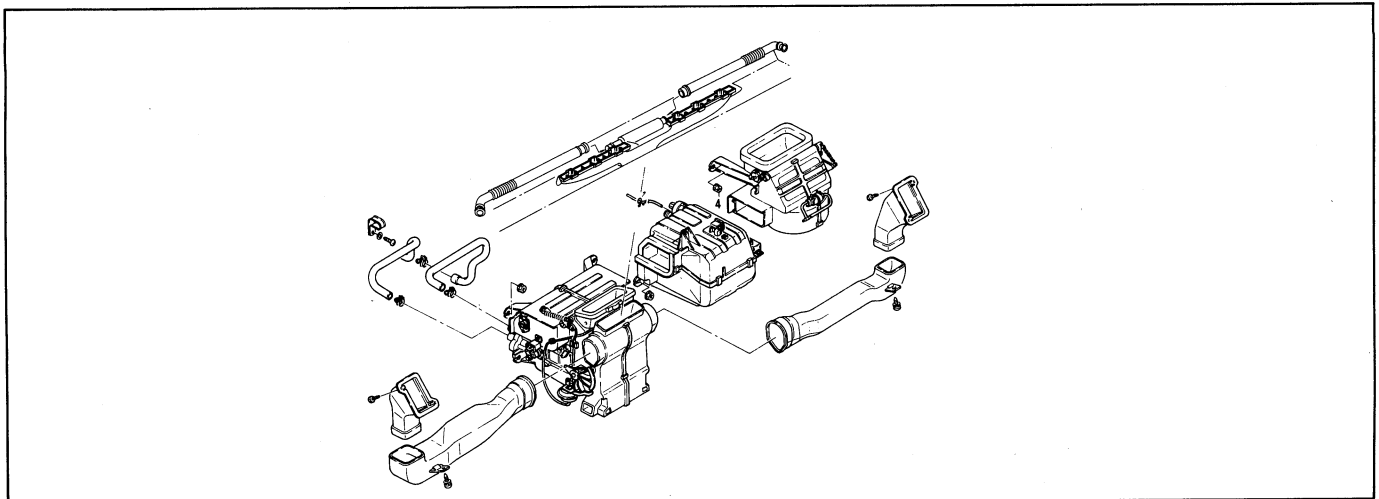
SYSTEM COOLING LINE



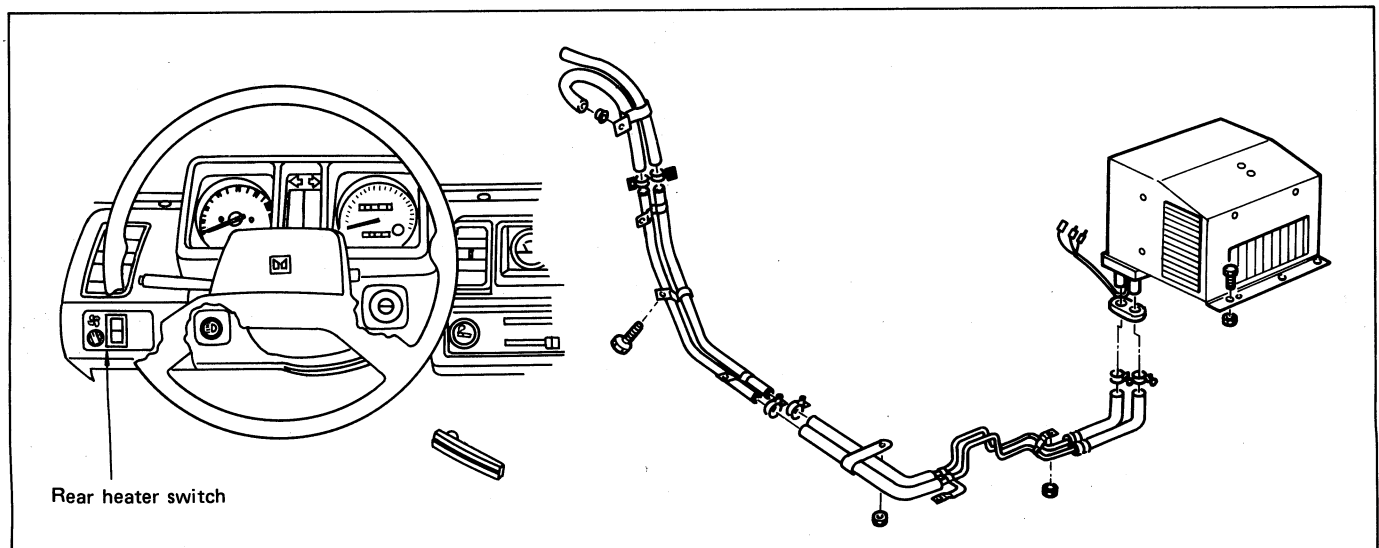
HEATER UNIT



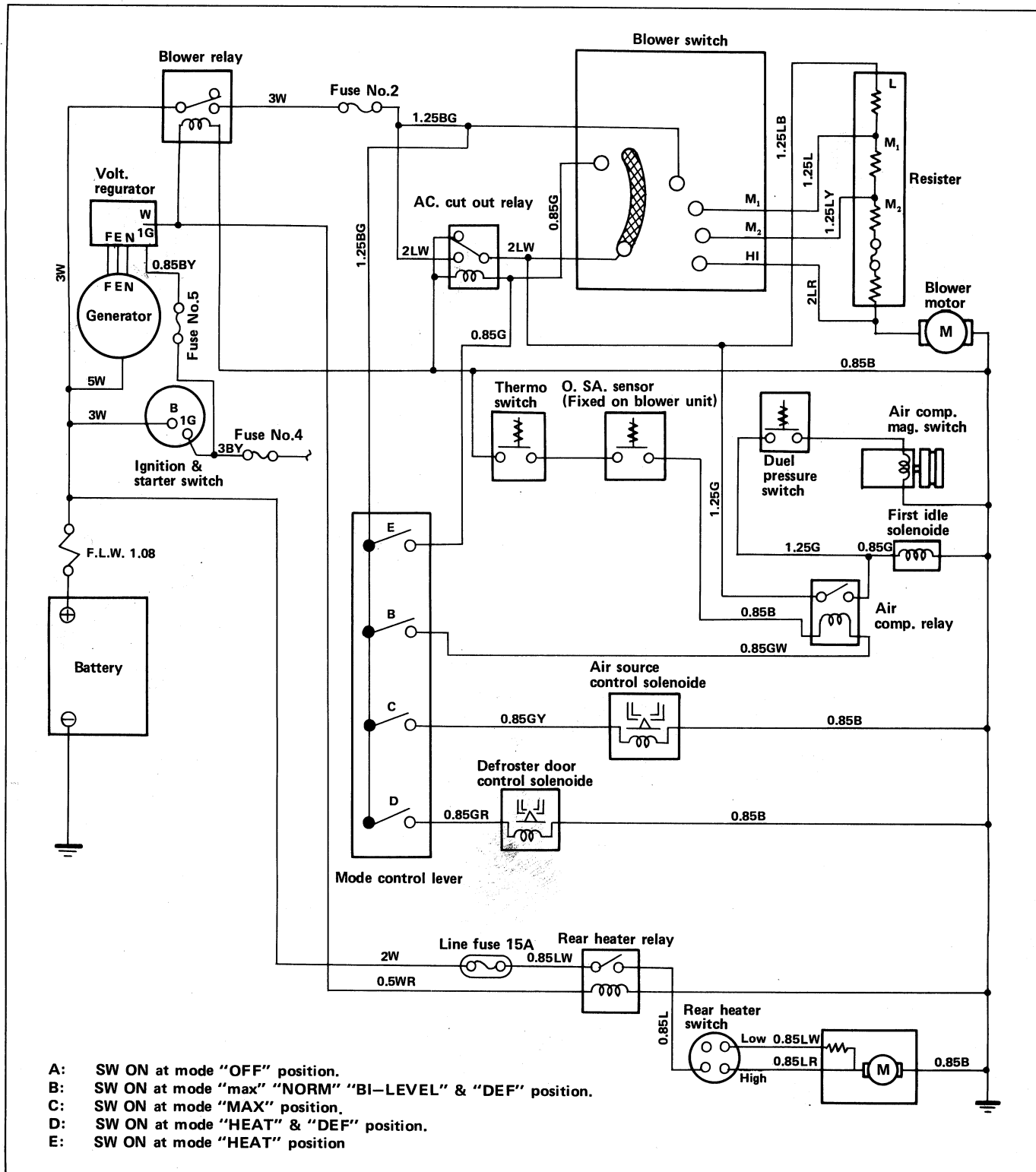
AIR CONDITIONING UNIT



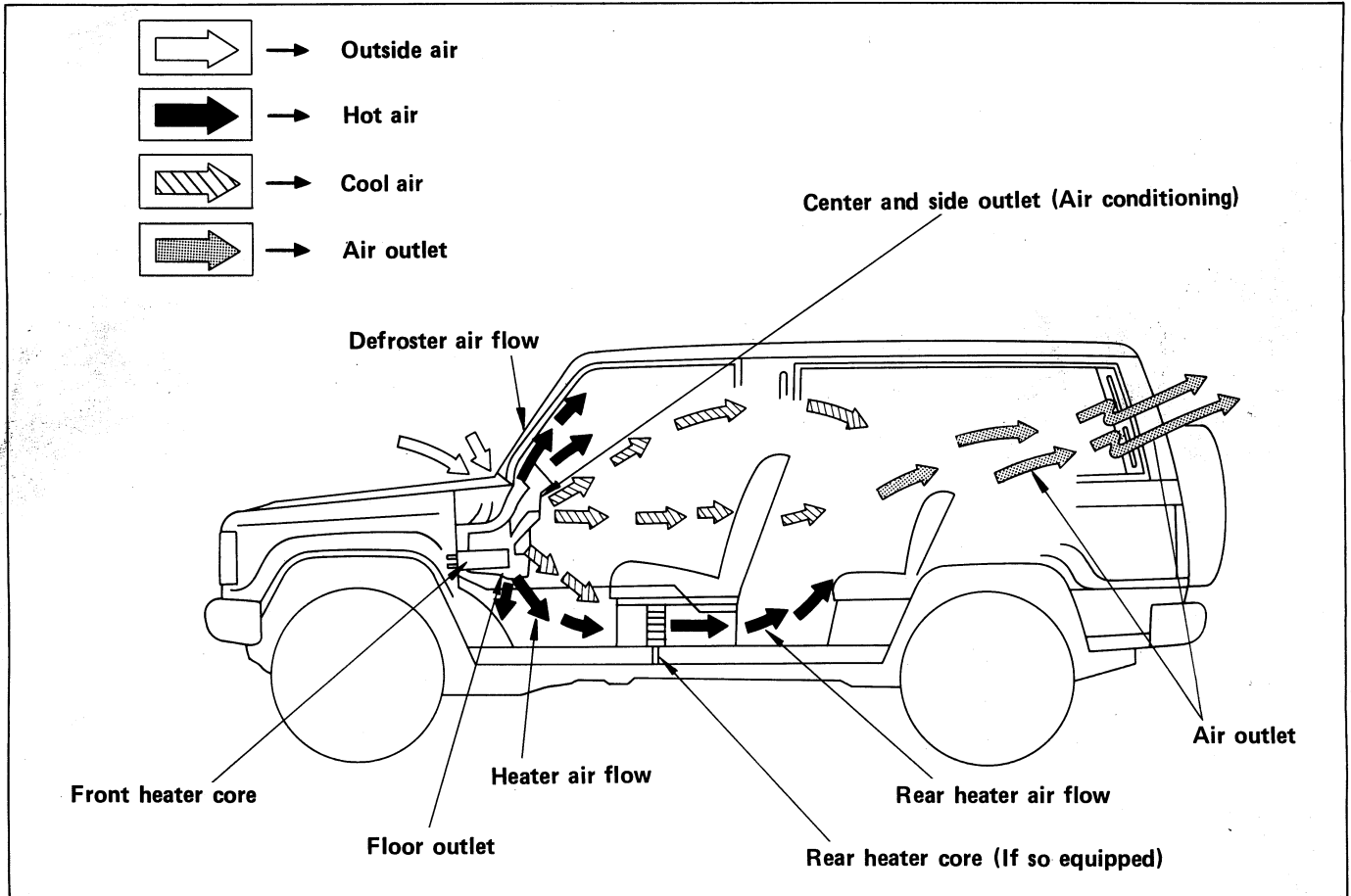
REAR HEATER UNIT



WIRING DIAGRAM

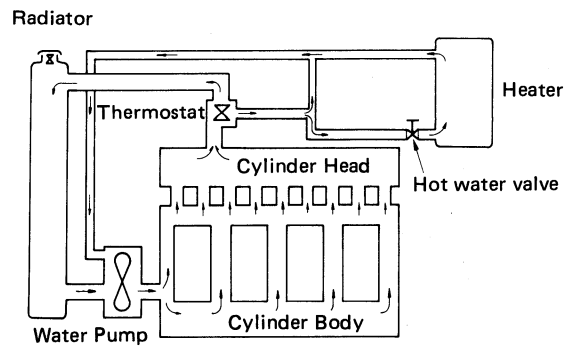


VENTILATION

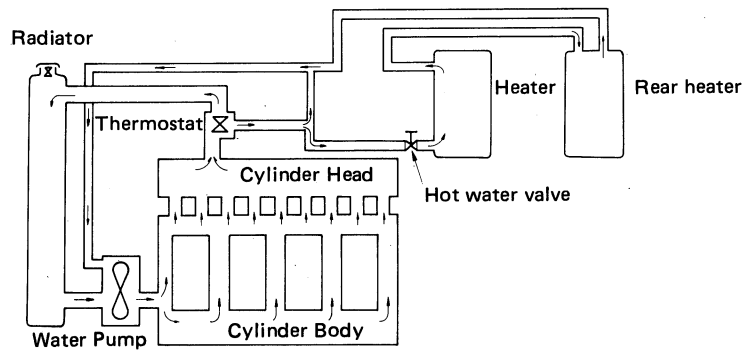


HOT WATER CIRCUITS

HEATER



HEATER WITH REAR HEATER



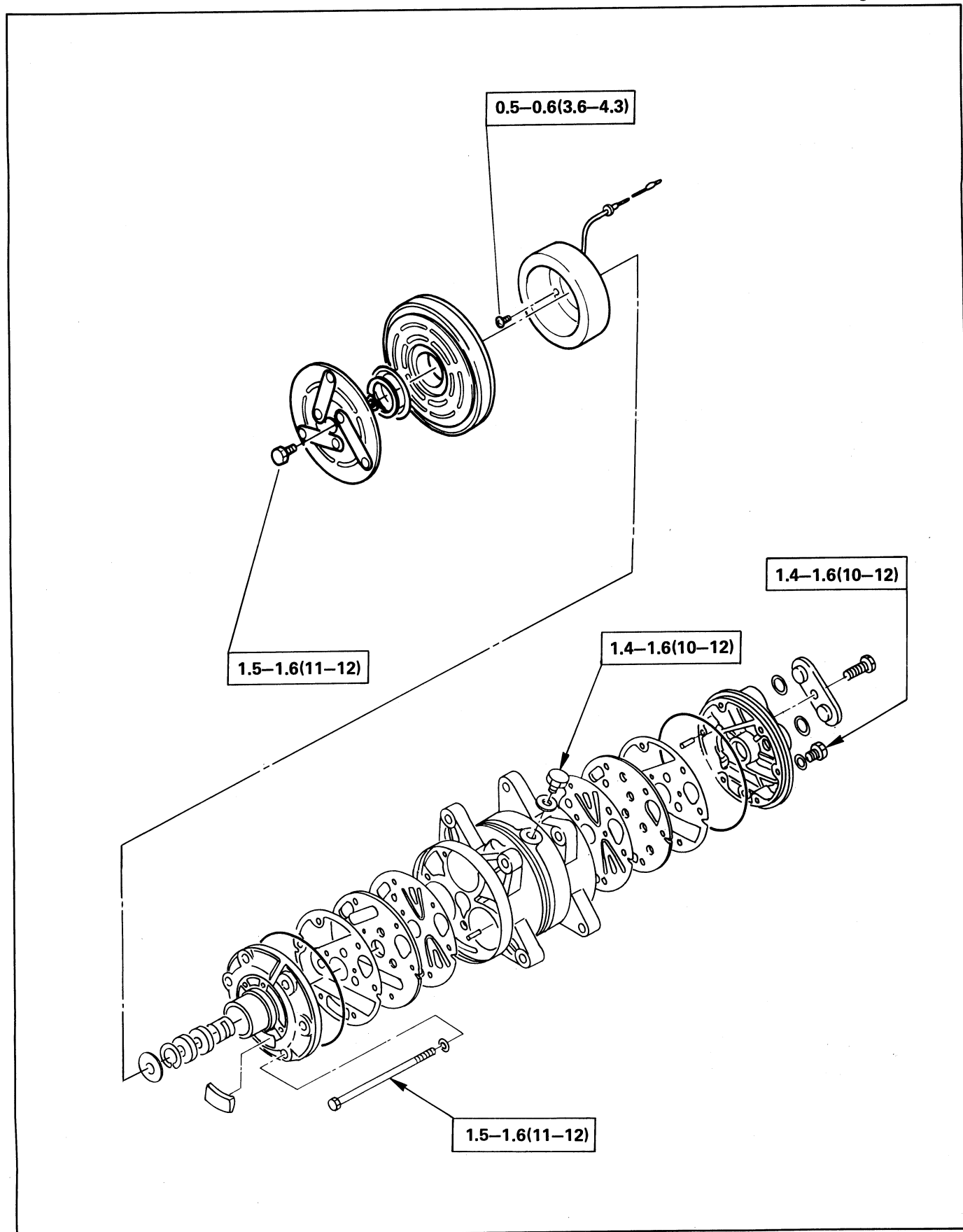
MAIN DATA AND SPECIFICATIONS

AIR COMPRESSOR			
Type		6 cylinder swash plate	
Displacement	cc(in. ³)	147 (9.0)	
Oil type		Suniso oil No. 5GS or equivalent	
Oil capacity	cc	150	
Magnetic clutch		Dry single disc type	
HEATER UNIT			
Type		Air mix type	
Core dimension	mm(in.)	(L x H x W)	161(6.34)x163(6.42)x45(1.77)
Capacity	kcal./hr	3200 kcal/hr	(240 m ³ /hr)
BLOWER UNIT			
Type		Siroco fan type Dia: 5.5 in.	
COOLING UNIT			
Type		Fin and tube Evaporator	
Evaporator dimension	mm(in.)	(L x H x W)	180(7.09)x190(7.48)x125(4.92)
Evaporator capacity	kcal./hr	300 kcal./hr	320m ³ /hr
CONDENSER			
Type		Aluminum louvered fins	
Dimension	mm(in.)	(L x H x W)	620(24.41)x269(10.59)x32(1.26)
Capacity	kcal./hr	6200 kcal./hr	wind velocity 5 m/sec.
RECEIVER-DEHYDRATOR		Assembly includes sight glass and temperature sensitive device	
REFRIGERANT			
Type		R — 12	
Capacity		0.95 kg (33.5 oz)	
ENGINE COOLING FAN		7 blades 390mm (15.4 in.) plastic with fan clutch	
IDLE SPEED-UP CONTROL		Idle speed controlled by solenoid switch	

MAJOR PARTS ; FIXING NUTS AND BOLTS

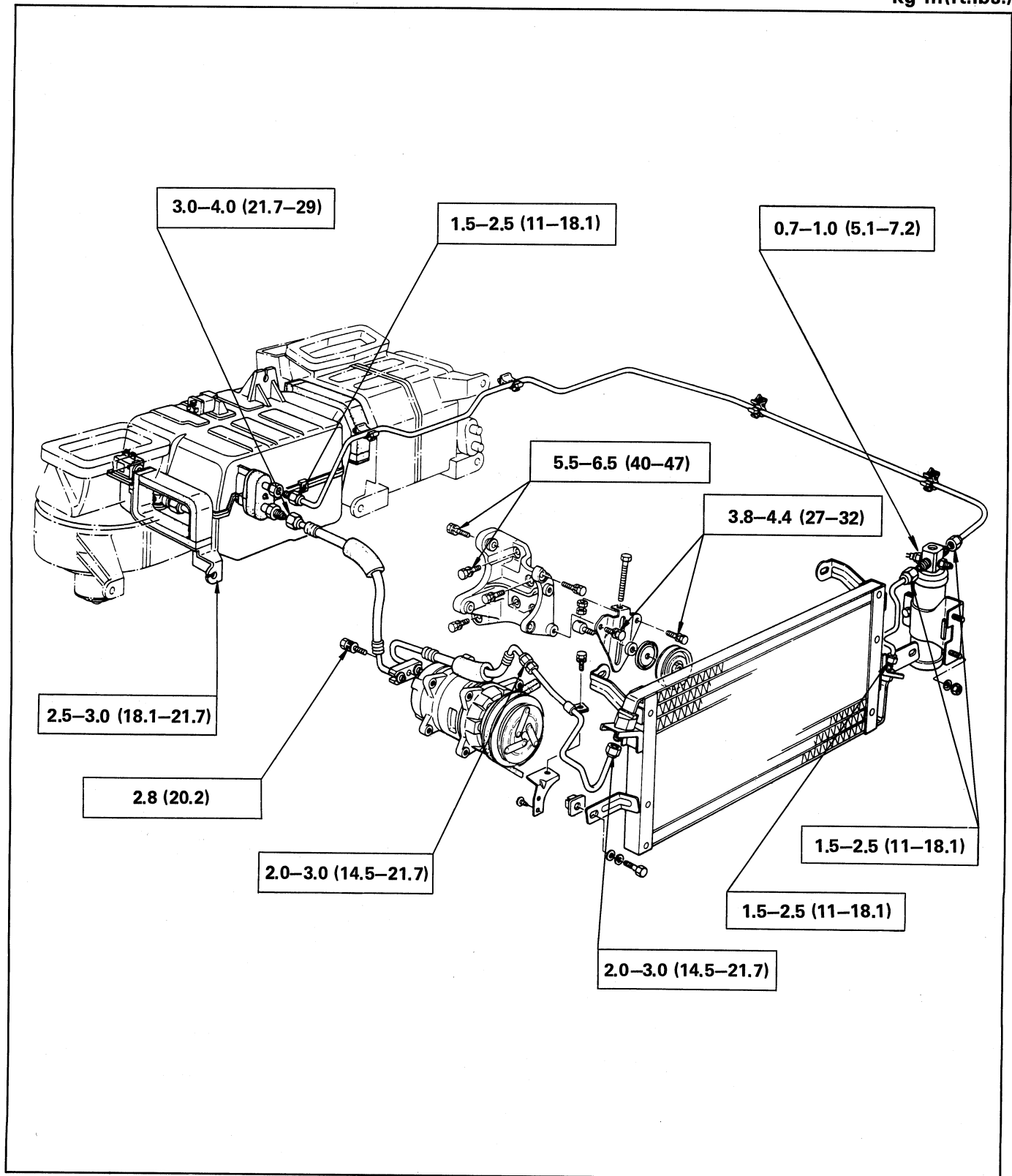
COMPRESSOR ASSEMBLY

kg-m(ft.lbs.)



REFRIGERATION SYSTEM

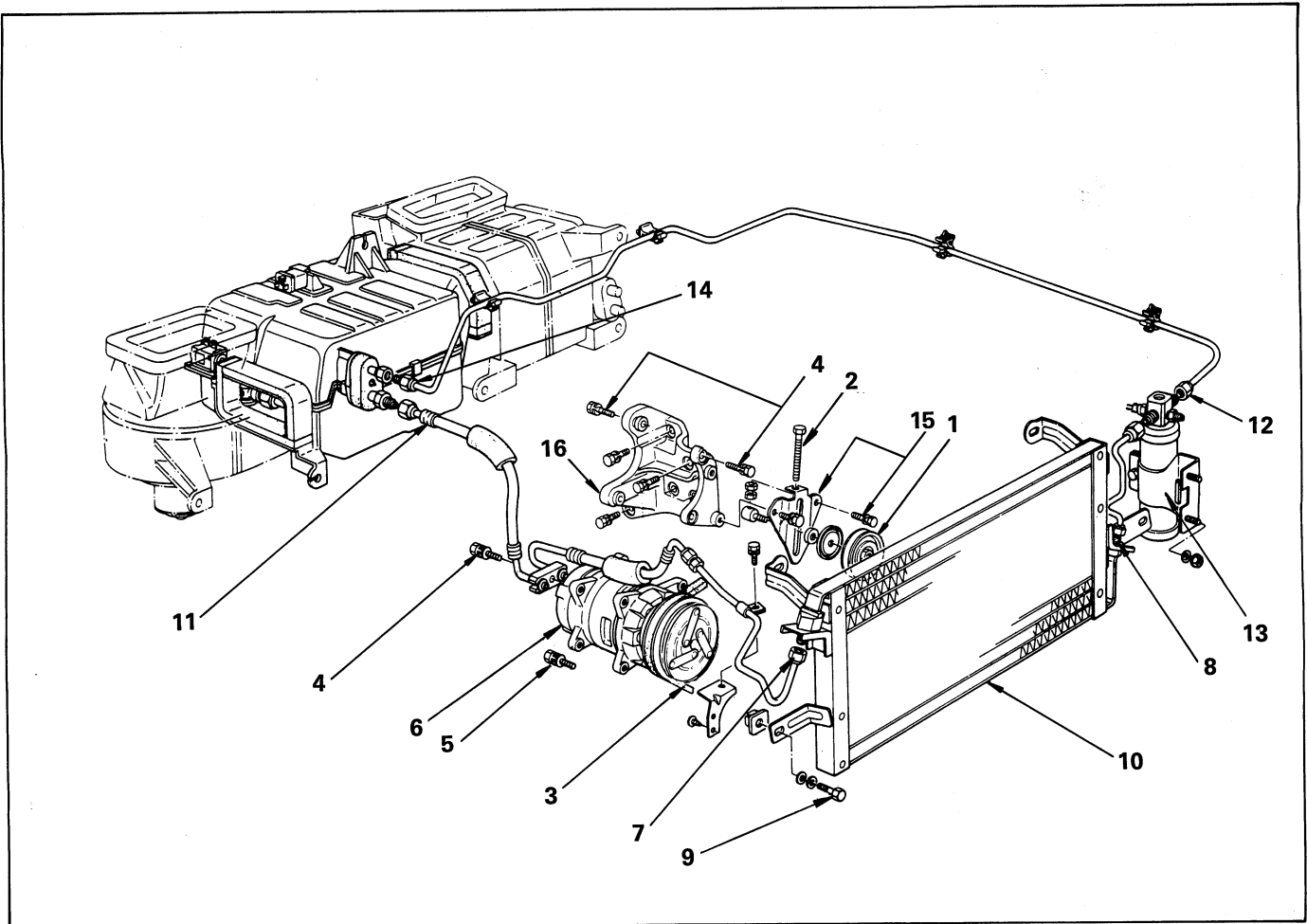
kg-m(ft.lbs.)



AIR CONDITIONING REFRIGERATION SYSTEM



REMOVAL AND INSTALLATION



Removal steps

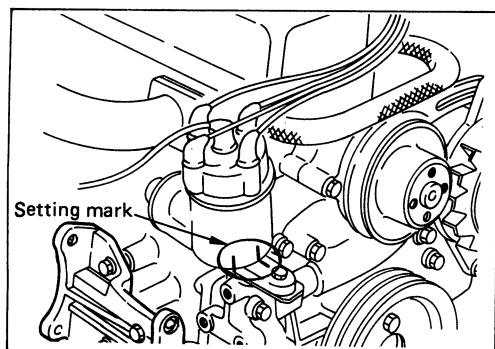
1. Nut (loose) ; idler pulley
2. Bolt (loose) ; idler pulley tension
3. Belt
4. Bolt ; compressor to flex/hose
- ▲ 5. Bolt ; compressor to bracket
6. Compressor assembly
7. Pipe ; condenser to compressor
8. Pipe ; condenser to receiver tank
9. Bolts ; condenser fixing
10. Condenser assembly
11. Flare nut hose assembly ; compressor to evaporator
12. Flare nut ; to receiver tank
13. Receiver tank assembly
14. Flare nut ; to evaporator
15. Bracket assembly ; idler
16. Bracket assembly ; compressor

Installation steps

- ▲ 16. Bracket assembly ; compressor
- ▲ 15. Bracket assembly ; idler
- ▲ 14. Flare nut ; to evaporator
13. Receiver tank assembly
- ▲ 12. Flare nut ; to receiver tank
- ▲ 11. Flare nut hose assembly ; compressor to evaporator
10. Condenser assembly
9. Bolts ; condenser fixing
- ▲ 8. Pipe ; condenser to receiver tank
- ▲ 7. Pipe ; condenser to compressor
6. Compressor assembly
- ▲ 5. Bolt ; compressor to bracket
- ▲ 4. Bolt ; compressor to flex/hose
- ▲ 3. Belt
2. Bolt (tighten) ; idler pulley tension
1. Nut (tighten) ; idler pulley



Important operation — Removal



5. Compressor fitting bolts

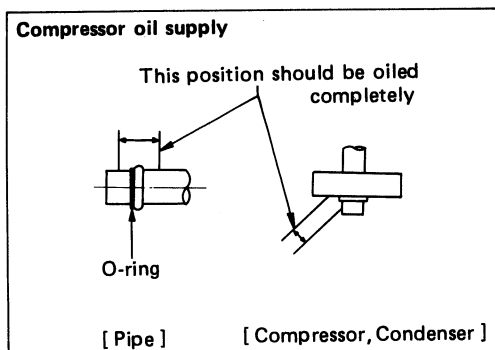
If you have difficulty in removing the compressor fixing bolts, first remove the distributor. Remember to make setting marks when removing the distributor.



INSPECTION AND REPAIR

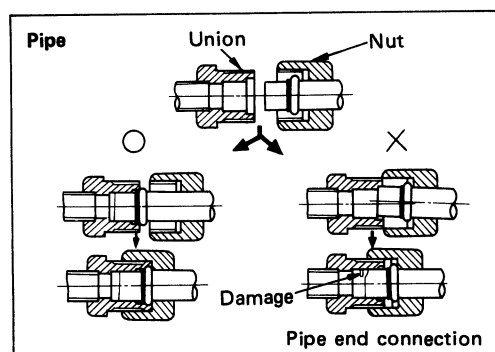
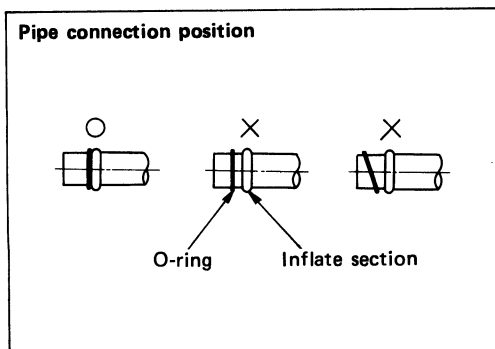
REFRIGERANT LINE CONNECTIONS

- The O-ring connection between the pipe and the hose is very easily damaged. Exercise extreme care when working with it.
Do not allow the hose to become twisted and bent when you are installing the refrigerant line.
- Refrigerant line connections have seated O-rings. Make the connections with a double spanner and close them to the specified torque.



ATTENTION: THINGS TO LOOK FOR WHEN MAKING REFRIGERANT LINE CONNECTIONS

- (1) Correct compressor oil levels are shown in the diagram to the left.
Do not apply compressor oil to the union nuts and bolts.



- (2) After connecting the hose and the pipe, make absolutely sure that the O-ring is securely attached to the inflate section.
- (3) The union nut and bolt should reach the base of the compressor. Tighten the nut as far as possible by hand.
Use a double spanner to further tighten the bolts to the specified torque. Do not overtighten the bolts. Doing so will make re-use of the hose and pipe impossible. It will also weaken the entire system's resistance to leakage.

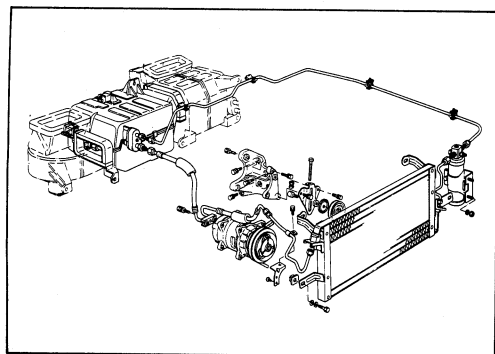


Important operations — Installation



Fixing torque

Parts name	Torque
16. Bracket assembly; compressor	5.5—6.5 (40—47)
15. Bracket assembly; idler	3.8—4.4 (27—32)
14. Flare nut; to evaporator	2.0—3.0 (14.5—21.9)
12. Flare nut; to receiver tank	2.0—3.0 (14.5—21.9)
11. Flare nut; hose assembly	4.0—5.0 (29—36)
8. Pipe; condenser to receiver tank	2.0—3.0 (14.5—21.7)
7. Pipe; condenser to compressor	3.0—4.0 (22—29)

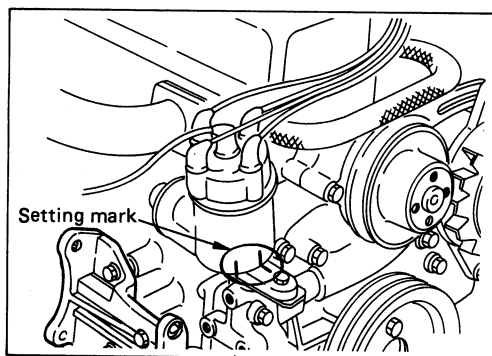


5. Compressor fixing bolts

Torque	kg-m(ft.lbs.)	5.5 — 6.5 (40 — 47)
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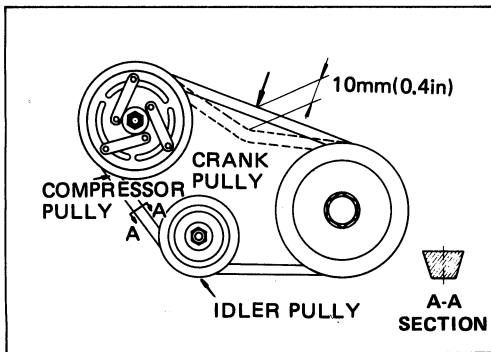


Reinstall the compressor fixing bolts and, if necessary, the distributor. If you are reinstalling the distributor, remember to align the setting marks which you made during the removal operation.



4. Bolt, compressor to flex, hose

Torque	kg-m(ft.lbs.)	2.8 (20.2)
--------	---------------	------------



3. Belt

Standard	deflection mm(in.)	
		10 (0.4)

Refer to Section 00 "General information" servicing for gas charging procedure.

• Gas charging



Leak at O-ring fitting connection

1. If refrigerant is leaking from the system, remove the connecting hose and carefully inspect the pipe seal for damage. If the seal is undamaged, replace the O-ring and reconnect the hose.

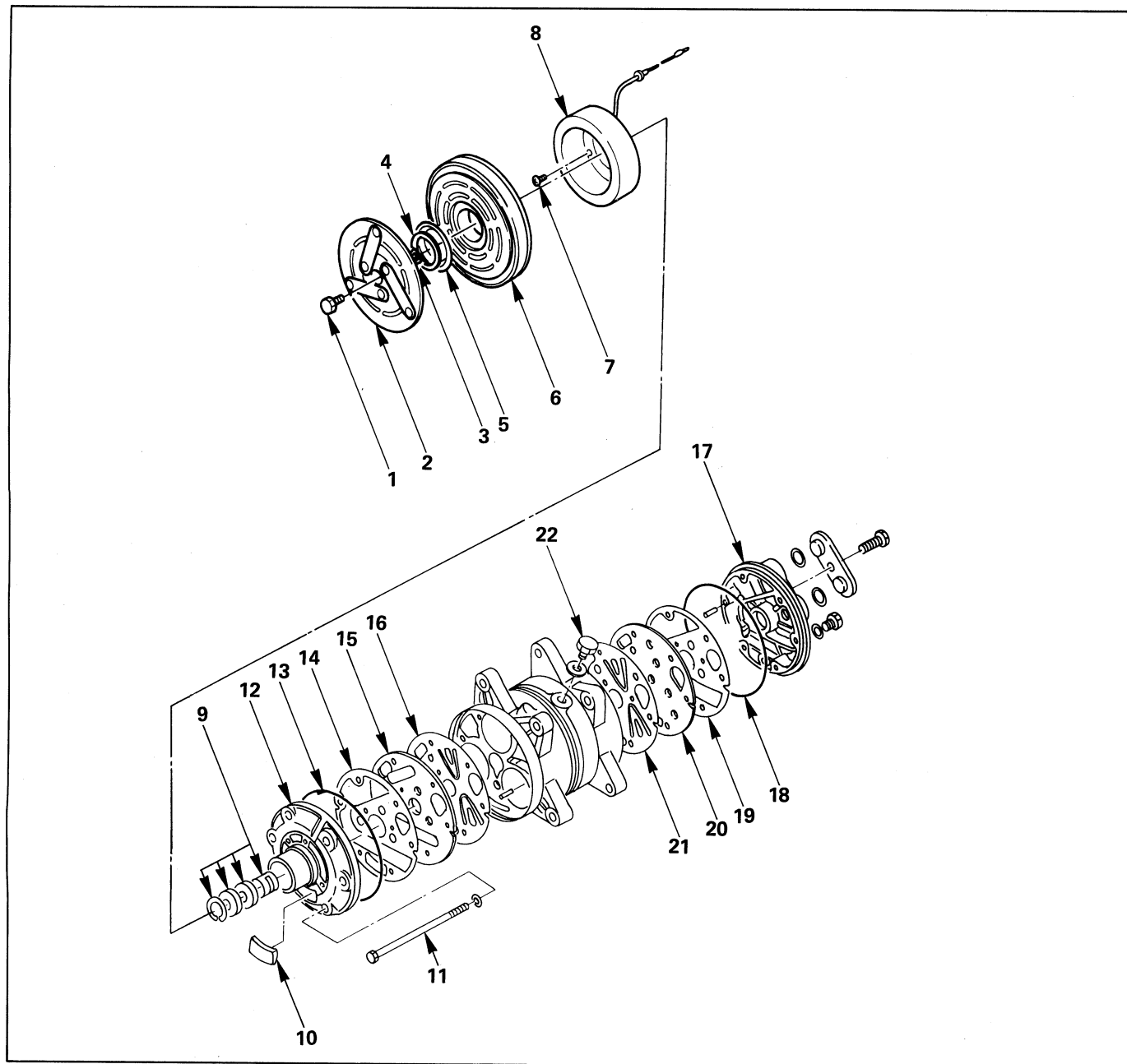
Do not overtighten the union nut in an attempt to stop refrigerant leakage. This will cause the O-ring to bind, resulting in damage to the seal.

2. Never re-use O-rings. Once installed, their shape changes with time. Always use new O-rings during service operations.

COMPRESSOR



DISASSEMBLY



Disassembly steps

- | | | |
|------------------------------|-----------------------------------|----------------------------------|
| ▲ 1. Bolt ; clutch | ▲ 9. Seal assembly ; shaft | 16. Valve ; suction |
| ▲ 2. Armature assembly | 10. Felt ; cylinder head | 17. Head ; cylinder, rear |
| 3. Shim | 11. Bolts ; plate to cylinder | 18. O-ring |
| ▲ 4. Ring ; snap | ▲ 12. Head ; cylinder, front | 19. Gasket ; cylinder |
| 5. Cover ; pulley | 13. O-ring | 20. Plate assembly ; valve, rear |
| ▲ 6. Pulley ; clutch, magnet | 14. Gasket ; cylinder | 21. Valve ; suction |
| 7. Screw ; coil, field | 15. Plate assembly ; valve, front | 22. Plug ; cylinder |
| ▲ 8. Coil ; field | | |

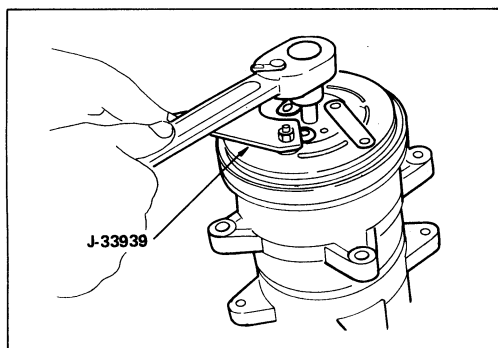


Important operations



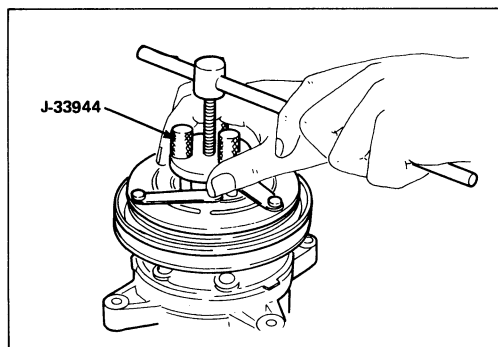
1. Bolt ; clutch

Clutch hub holder ; J-33939

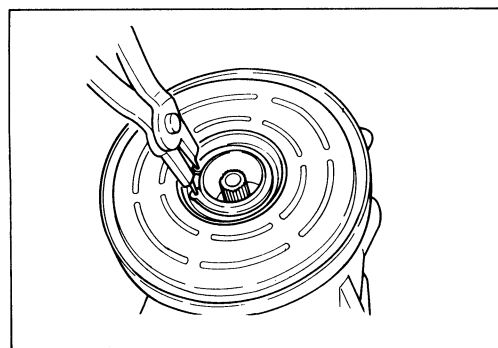


2. Armature assembly

Clutch hub remover ; J-33944



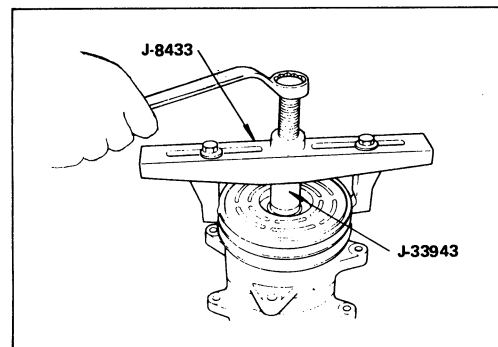
4. Ring ; snap

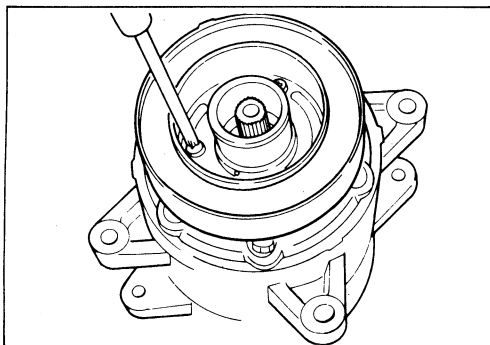


6. Pulley ; clutch, magnet

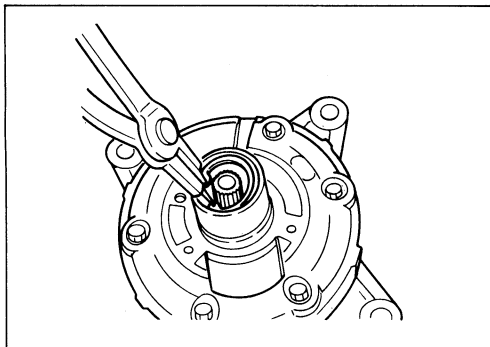
Pulley puller ; J-8433

Pulley puller pilot ; J-33943

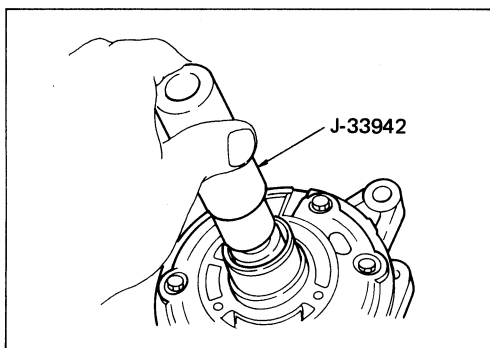




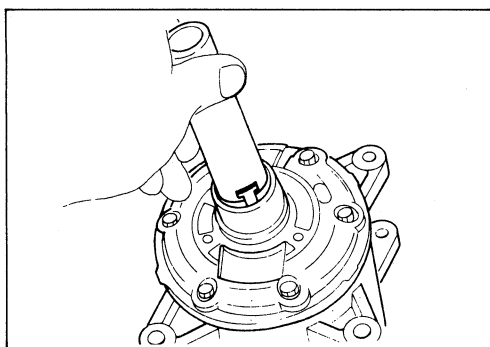
8. Coil field



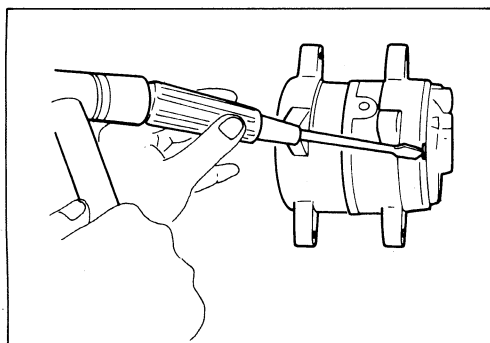
9. Seal assembly
Snap ring plier ; J-5207



Seal assembly ; shaft
Seal seat remover ; J-33942



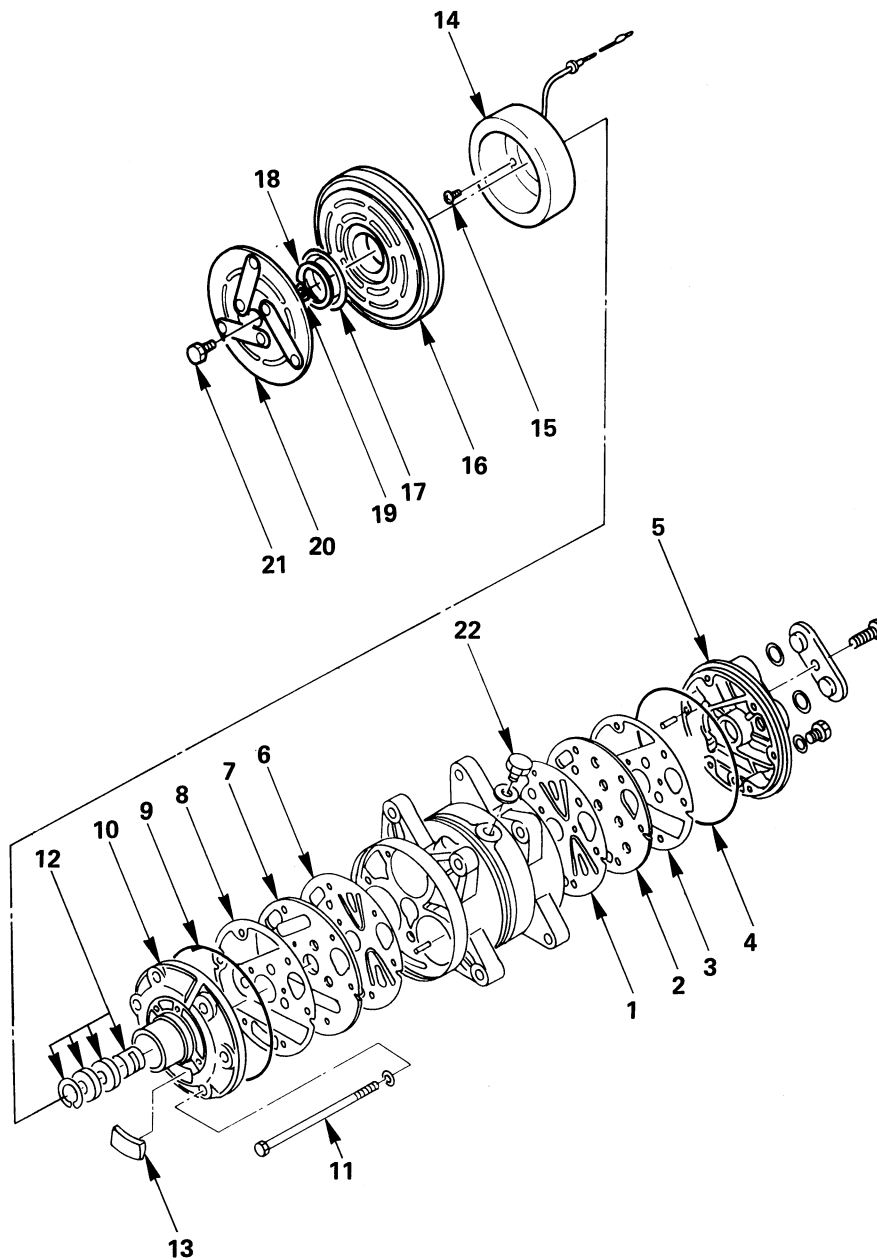
Seal remover ; J-33941



12. Head ; cylinder, front



REASSEMBLY



Reassembly steps

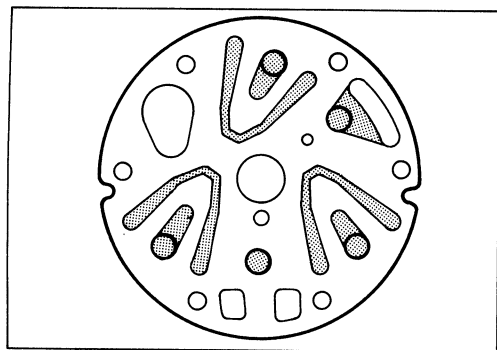
- | | | |
|------------------------------------|---------------------------------|-------------------------------|
| ▲ 1. Valve ; suction | 9. O-ring | ▲ 16. Pulley ; clutch, magnet |
| ▲ 2. Plate assembly ; valve | 10. Head ; cylinder, front | 17. Cover ; pulley |
| 3. Gasket ; cylinder | ▲ 11. Bolts ; plate to cylinder | ▲ 18. Ring ; snap |
| 4. O-ring | ▲ 12. Seal assembly ; shaft | ▲ 19. Shim location |
| 5. Head ; cylinder, rear | 13. Felt ; cylinder head | 20. Armature assembly |
| ▲ 6. Valve ; suction | 14. Coil ; field | ▲ 21. Bolt ; clutch |
| ▲ 7. Plate assembly ; valve, front | ▲ 15. Screw ; coil, field | ▲ 22. Plug ; cylinder |
| 8. Gasket ; cylinder | | |



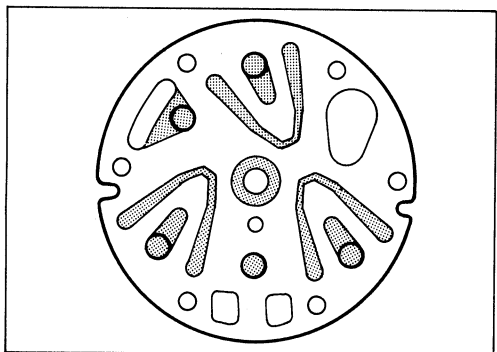
Important operations



1. Valve ; suction
2. Plate assembly ; valve (rear)

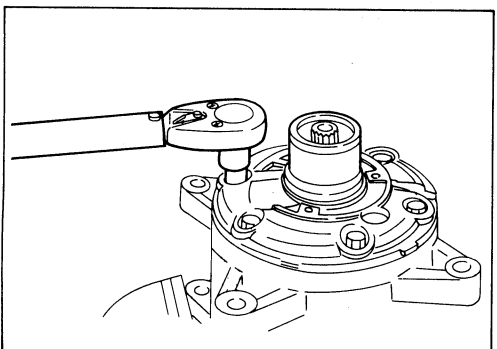


6. Valve ; suction
7. Plate assembly ; valve (front)



11. Bolts ; plate to cylinder

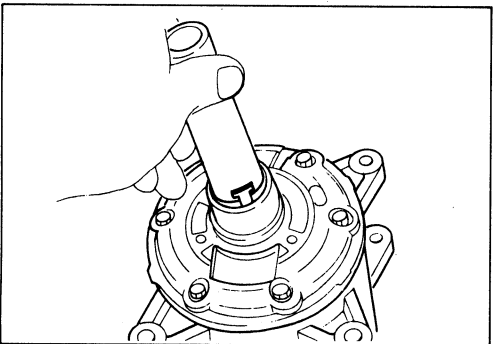
Torque	kg-m(ft.lbs.)	1.5 — 1.6 (11 — 12)
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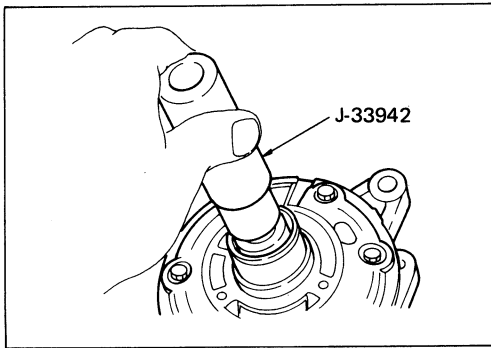


12. Seal assembly ; shaft

Seal installer ; J-33941

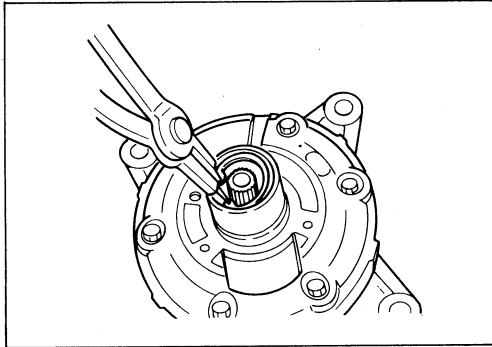
- Note:**
1. Always use new parts.
 2. When installing a new seal assembly, take care not to damage the O-rings at the end of the shaft splines.





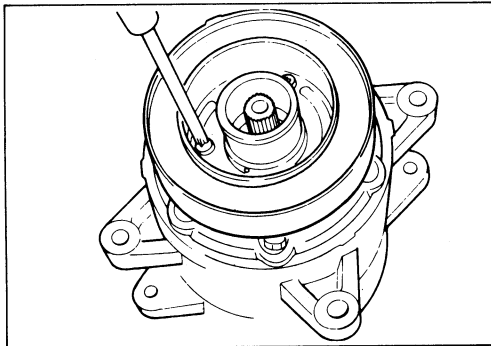
Gasket

Seal seat remover ; J-33942



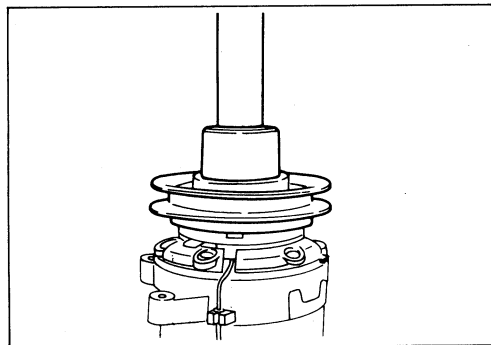
Seal seat retaining ring

Snap ring plier ; J-5207



15. Screw ; coil, field

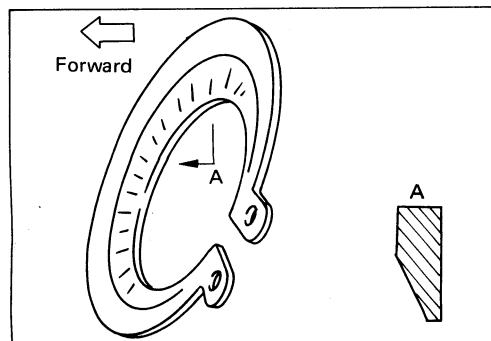
Torque	kg-m(ft.lbs.)	0.5 — 0.6 (3.6 — 4.3)
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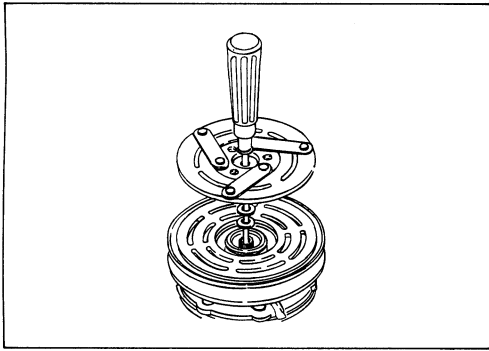
16. Pulley ; clutch, magnet

Pulley installer ; J-33940

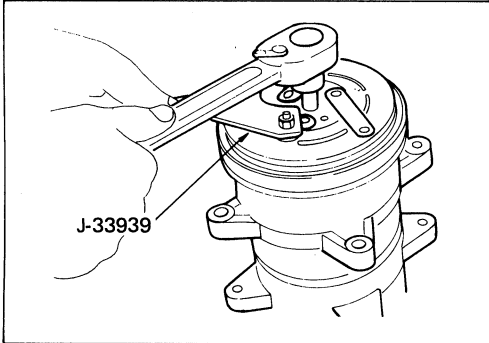
Grip ; J-8092



18. Ring ; snap



19. Shim location

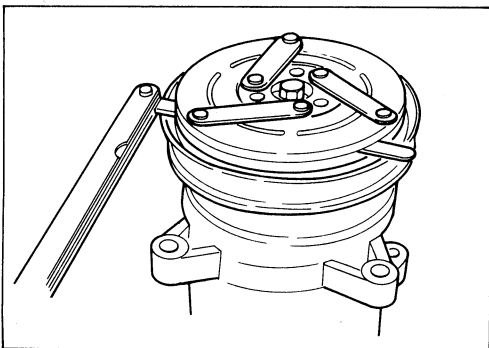


21. Bolts ; clutch

Clutch hub holder ; J-33939

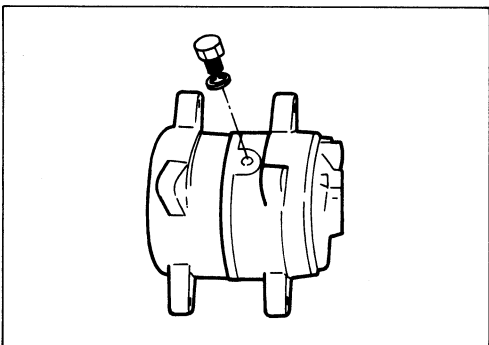


Torque	kg-m(ft.lbs.)	1.5 — 1.6 (11 — 12)
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Hub clearance

Standard	mm(in.)	0.3 — 0.6 (0.012 — 0.024)
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22. Plug ; cylinder

Fill compressor with 0.15 liters (1.6 U.S.qt) of new 525 viscosity refrigeration oil, install drain plug and new gasket.

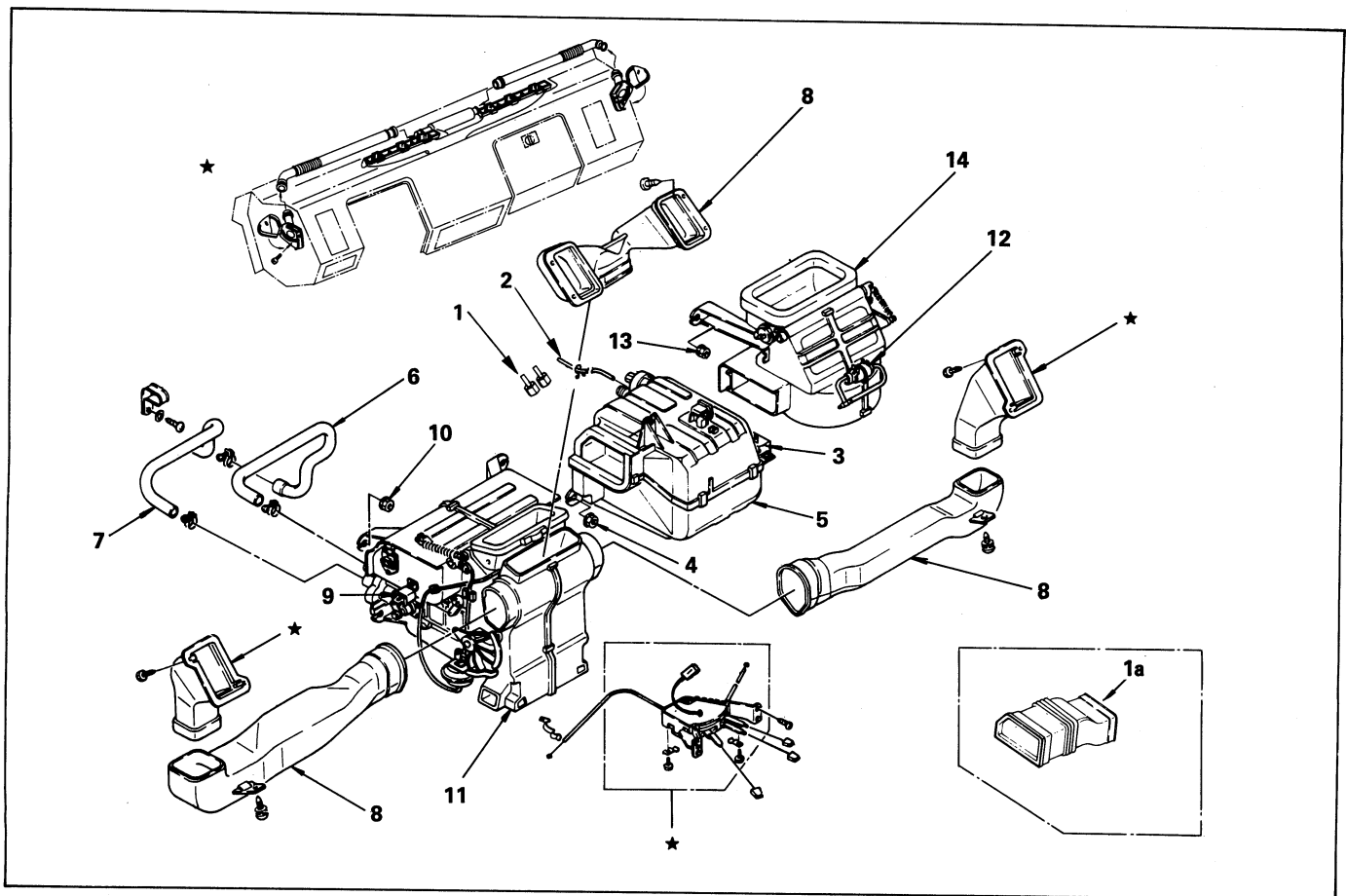


Torque	kg-m(ft.lbs.)	1.4 — 1.6 (10 — 12)
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HEATER UNIT, EVAPORATOR ASSEMBLY AND BLOWER UNIT



REMOVAL AND INSTALLATION



Reassembly steps

★ Before evaporator assembly and heater unit removal, refer to section 11 "BODY" for instrument panel removal procedure

1. Flare nuts ; evaporator to compressor and reciver tank
2. Vacuum hose
3. Connectors ; evaporator relay
4. Nuts; evaporator
5. Evaporator assembly
- 1a Duct ; (if air conditioning system not equipped, following removal steps)
6. Hose ; heater
7. Hose ; heater
8. Duct ; air
9. Connectors ; heater unit relay
10. Nuts ; heater unit
11. Heater unit assembly
12. Connectors and vacuumhose ; flower unit
13. Nuts ; blower unit
14. Blower unit assembly

Installation steps

14. Blower unit assembly
 13. Nuts ; blower unit
 12. Connectors and vacuum hose ; blower unit
 - ▲ 11. Heater unit assembly
 10. Nuts ; heater unit
 9. Connectors ; heater unit relay
 8. Duct ; air
 7. Hose ; heater
 6. Hose ; heater
 - 1a Duct ; (if air conditioning system not equipped, following removal steps)
 5. Evaporator assembly
 4. Nuts; evaporator
 3. Connectors ; evaporator relay
 2. Vacuum hose
 - ▲ 1. Flare nuts ; evaporator to compressor and reciver tank
- ★ After evaporator assembly and heater unit installation, refer to section 11 "BODY" for instrument panel procedure



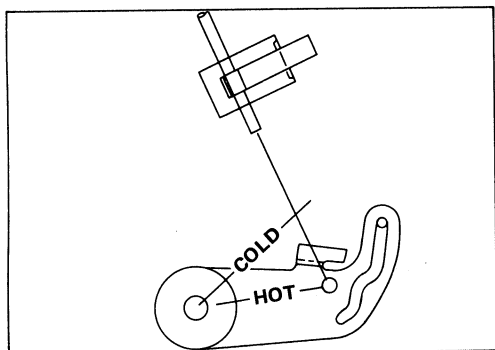
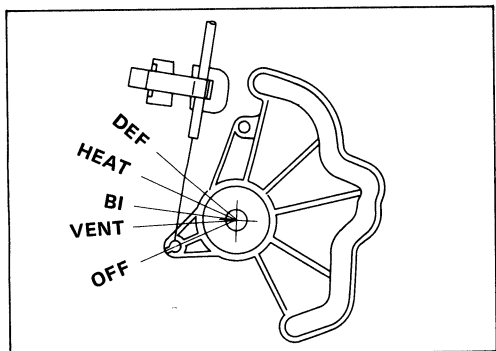
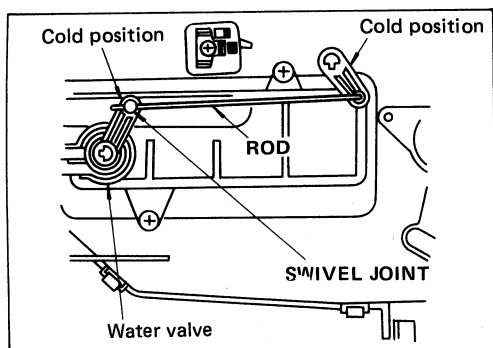
Important operations — Installation



11. Heater unit

- Water valve link rod adjustment

- (1) Set the air mix door in the stop position in a counter-clockwise direction (cold position).
- (2) Move the water valve lever to the stop position in a clockwise direction (cold position).
- (3) Secure the link rod to the swivel joint with the screw.



- Mode and temp cable

- (1) Attach the control assembly to the instrument panel using screws.
- (2) Connect the cable, with the mode selector lever and heater assembly lever set in the OFF position. Secure the outer tube with cable clip.

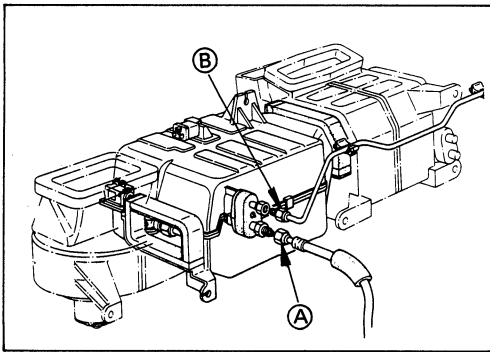
- (3) Connect the cable with the temperature lever and heater lever set in the HOT position, then fix the outer tube with a cable clip. Check all doors and the water valve. If the doors or the valve are not closing properly, loosen the cable clamp screw at the control and adjust the cable length as required.

- Defroster door — The defroster door should be in the defroster position when the control lever is moved to the DEF & HEAT positions. Air is directed to the defroster outlets.

- Heat door — In the positions of HEAT and BI-LEVEL, air is directed out the floor outlets. Air is not delivered in other positions. However, when the heater is in use, some air is directed to the defroster.

- Vent door — In the positions of VENT and BI-LEVEL, air is directed out the center and side outlets. Air is not delivered to any other position.

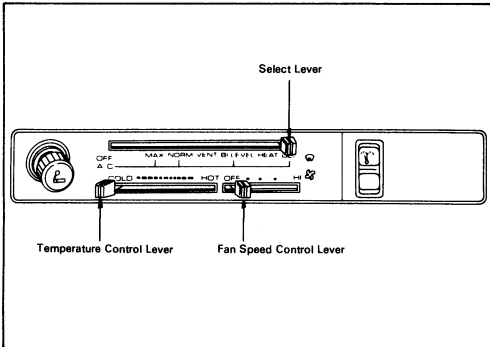
- Air mix door — When the temperature control lever is in the HOT position, hot air is delivered and the water valve is opened fully. In COLD position, non-heated air is delivered and the water valve is completely closed.



1. Flare nuts ; evaporator to compressor and receiver tank

kg-m(ft.lbs.)

To compressor A	3.0 — 4.0 (22 — 29)
To receiver tank B	1.5 — 2.5 (11 — 18)



Note: ★ Control levers

Operating tips refer to "OWNER'S MANUAL"

★ Air flows

Selector lever position	Blower speeds available	Air source	Def. door	Vent door	Heat door	Outside air door	Compressor
OFF	Off	Outside	Closed	Closed	1/2 Open	Open	OFF
MAX (A/C)	All	Inside	Closed	Open	Closed	Closed	ON*
NORM	All	Outside	Closed	Open	Closed	Open	ON*
VENT	All	Outside	Closed	Open	Closed	Open	OFF
BILEVEL	All	Outside	Closed	1/2 Open	1/2 Open	Open	ON*
HEAT	All	Outside	Open	Closed	Open	Open	OFF
DEF	All	Outside	Open	Closed	Closed	Open	ON*

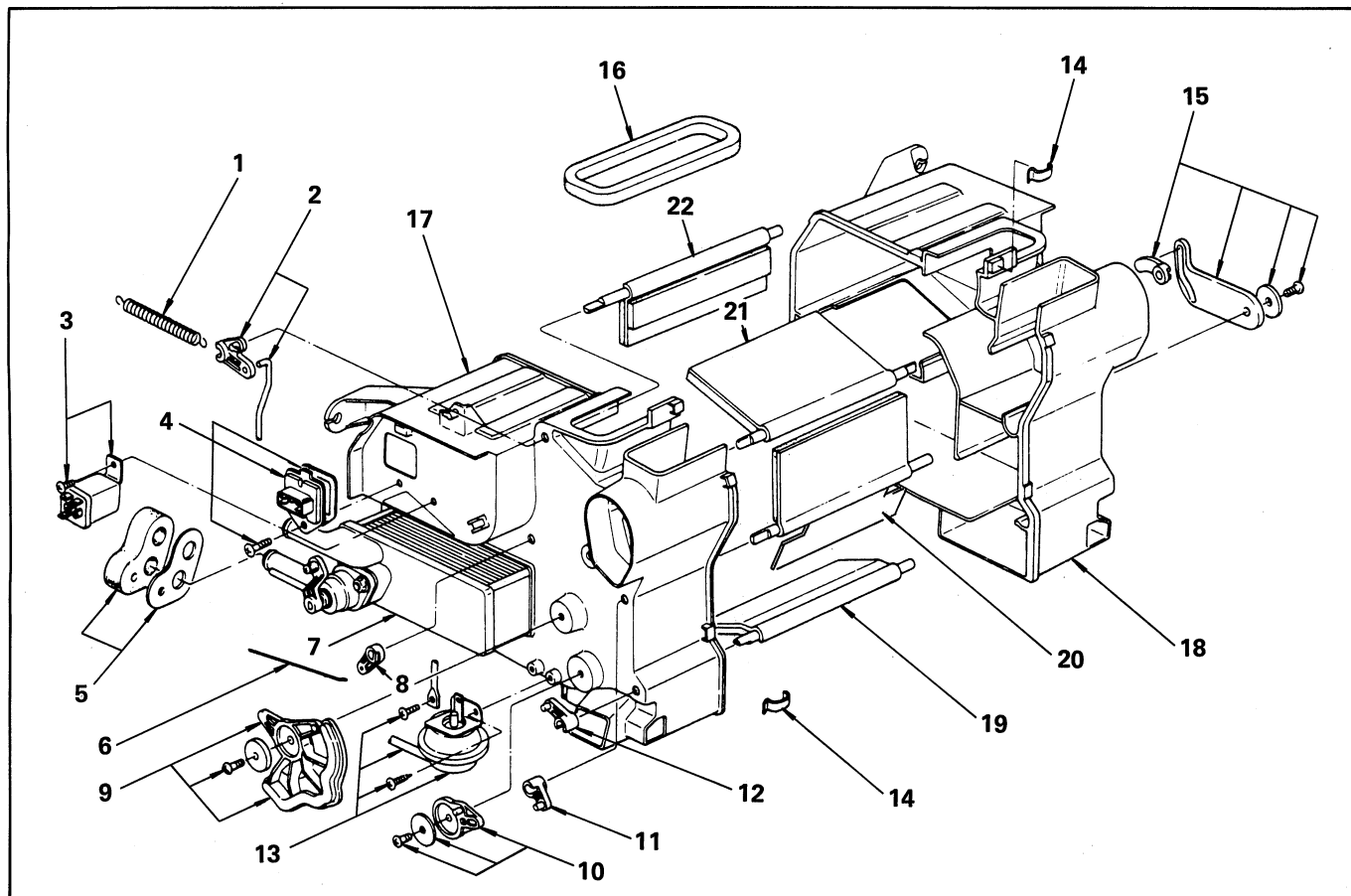
% : 15% outside air enters vehicle

* : The compressor turns off when, the air temperature is below 1°C (33.8°F) and turns on when the air temperature reaches 4°C (39.2°F).

HEATER UNIT



DISASSEMBLY & REASSEMBLY



Disassembly steps

1. Spring ; defroster door
2. Rod and lever ; defroster door
3. Relay ; battery
4. Resistor ; air conditioning
5. Plate and seal
6. Rod water valve
7. Core assembly
8. Lever mix door
9. Link ; main mode control
10. Relay link
11. Lever ; vent door
12. Lever ; heater door
13. Diaphragm ; defroster
14. Attaching parts
15. Relay link mix door
16. Seal
17. Case ; LH
18. Case ; RH
19. Door ; heat foot
20. Door ; side vent
21. Door ; heat mix
22. Door ; defroster

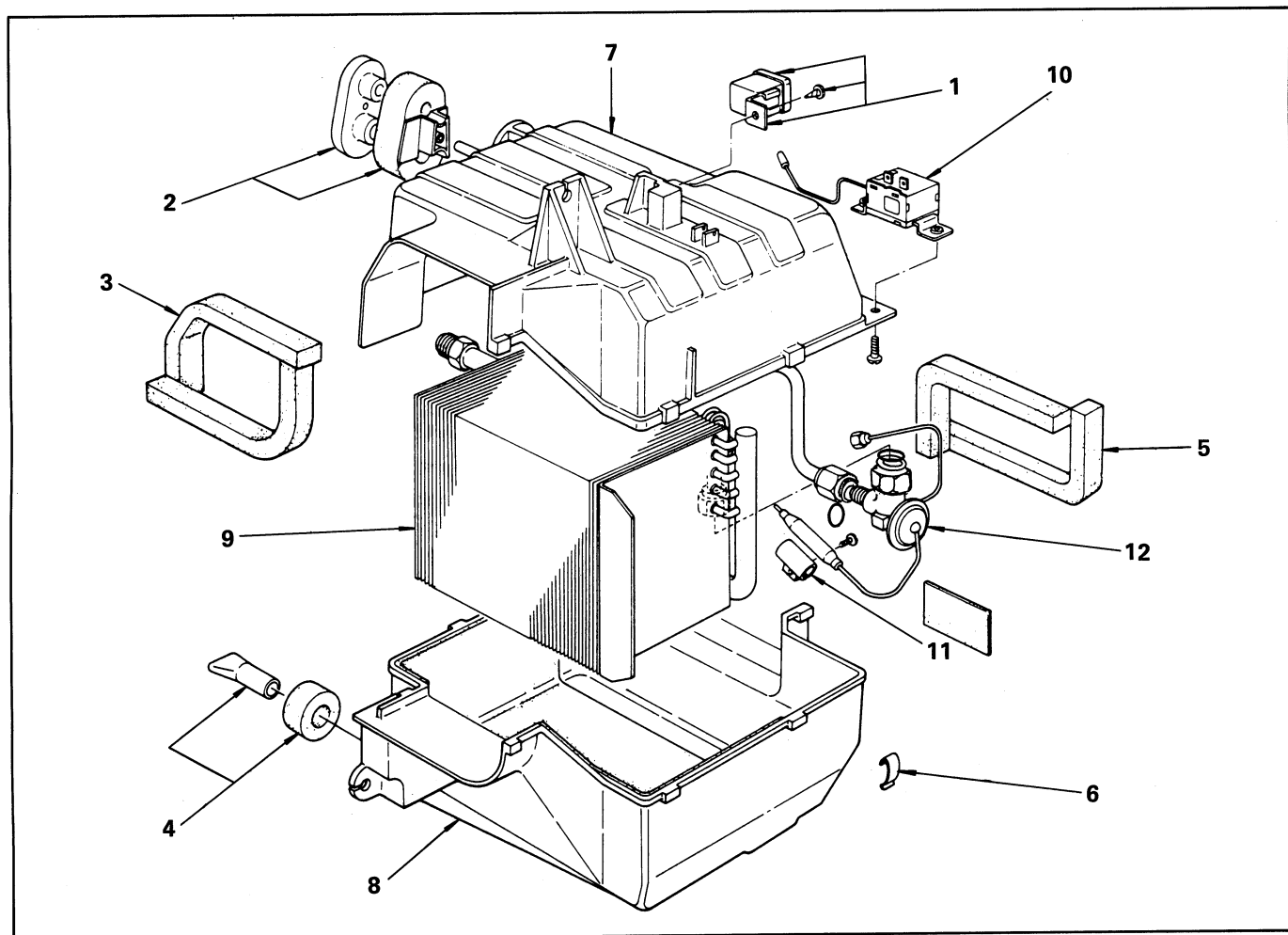
Reassembly steps

To reassemble, follow the disassembly procedure in reverse order.

EVAPORATOR UNIT



DISASSEMBLY & REASSEMBLY



Disassembly steps

1. Relay ; compressor
2. Seal and connector ; vacuum
3. Seal
4. Seal and drain hose
5. Seal
6. Attaching parts
7. Case ; upper
8. Case ; lower
9. Core assembly
10. Switch ; thermostat
11. Clip ; sensing tube
12. Expansion valve assembly

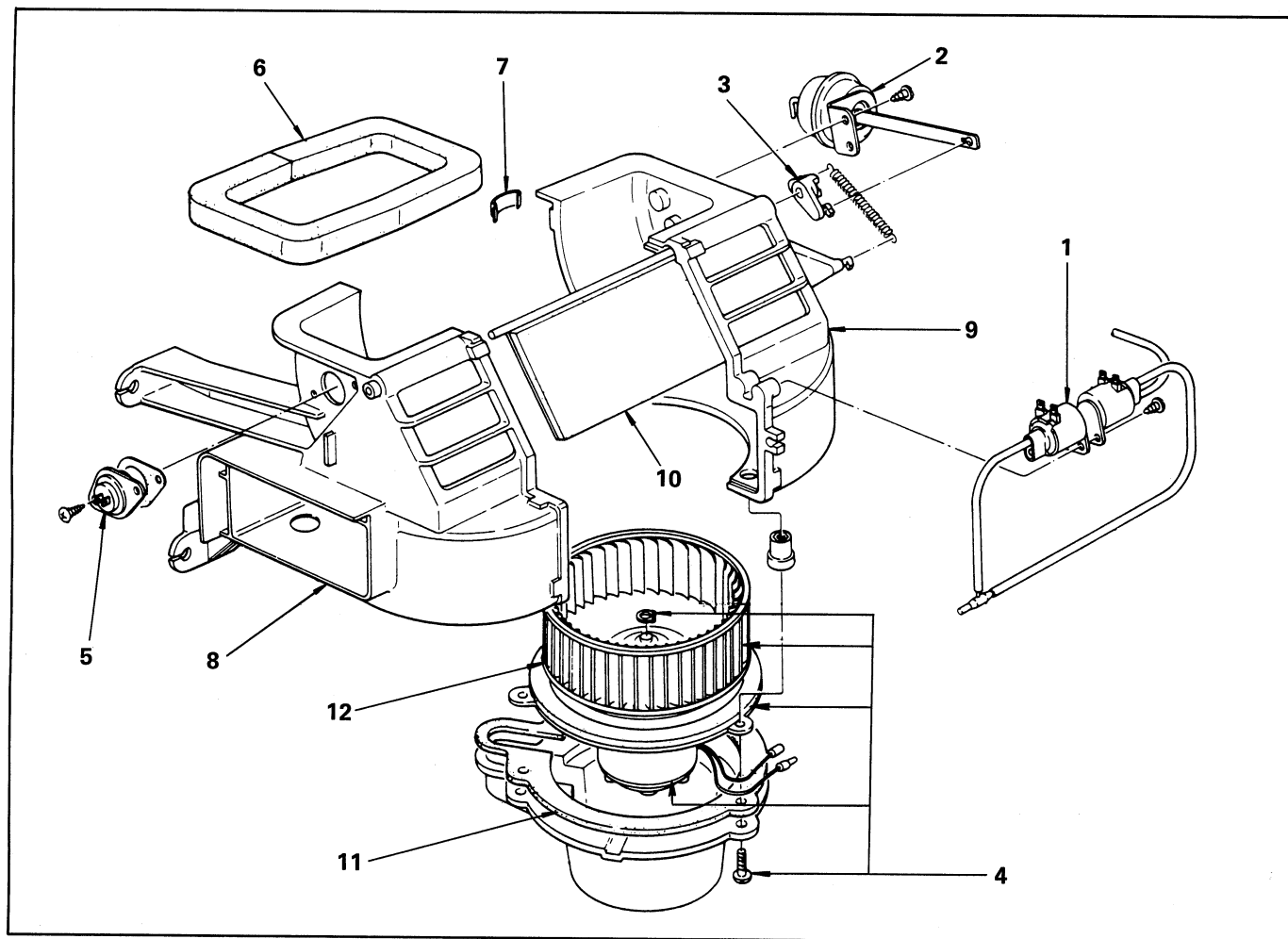
Reassembly steps

To reassemble, follow the disassembly procedure in reverse order.

BLOWER UNIT



DISASSEMBLY & REASSEMBLY



Disassembly steps

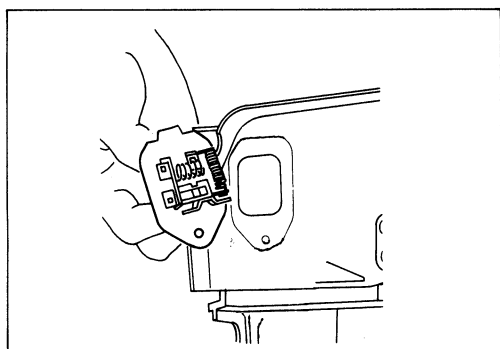
1. Solenoid valve ; defroster door and air source control
2. Diaphragm assembly ; air source control
3. Spring and lever ; door
4. Blower motor assembly
5. Thermo-sensor assembly
6. Seal
7. Attaching parts
8. Case ; LH
9. Case ; RH
10. Door, blower unit
11. Core ; blower motor
12. Fan ; blower motor

Reassembly steps

To reassemble, follow the disassembly procedure in reverse order.

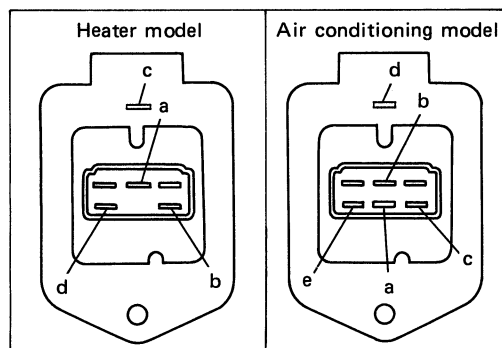


INSPECTION AND REPAIR

**Resistor**

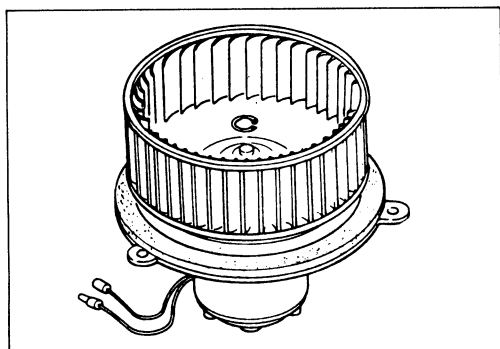
Fixed on left side of heater unit.

Replace the resistor with a new one if the coil is found to be open or if the resistance value deviates from the specified range.



Heater only model			
Heat mode		Vent mode	
a — b	3.19 Ω	a — c	2.80 Ω
b — d	1.23 Ω	b — c	0.84 Ω
c — d	0.39 Ω		

Air conditioning model			
Heat mode		Vent mode	
a — e	2.20 Ω	a — d	1.82 Ω
b — e	1.25 Ω	b — d	0.87 Ω
c — e	0.71 Ω	c — d	0.33 Ω
d — e	0.38 Ω		

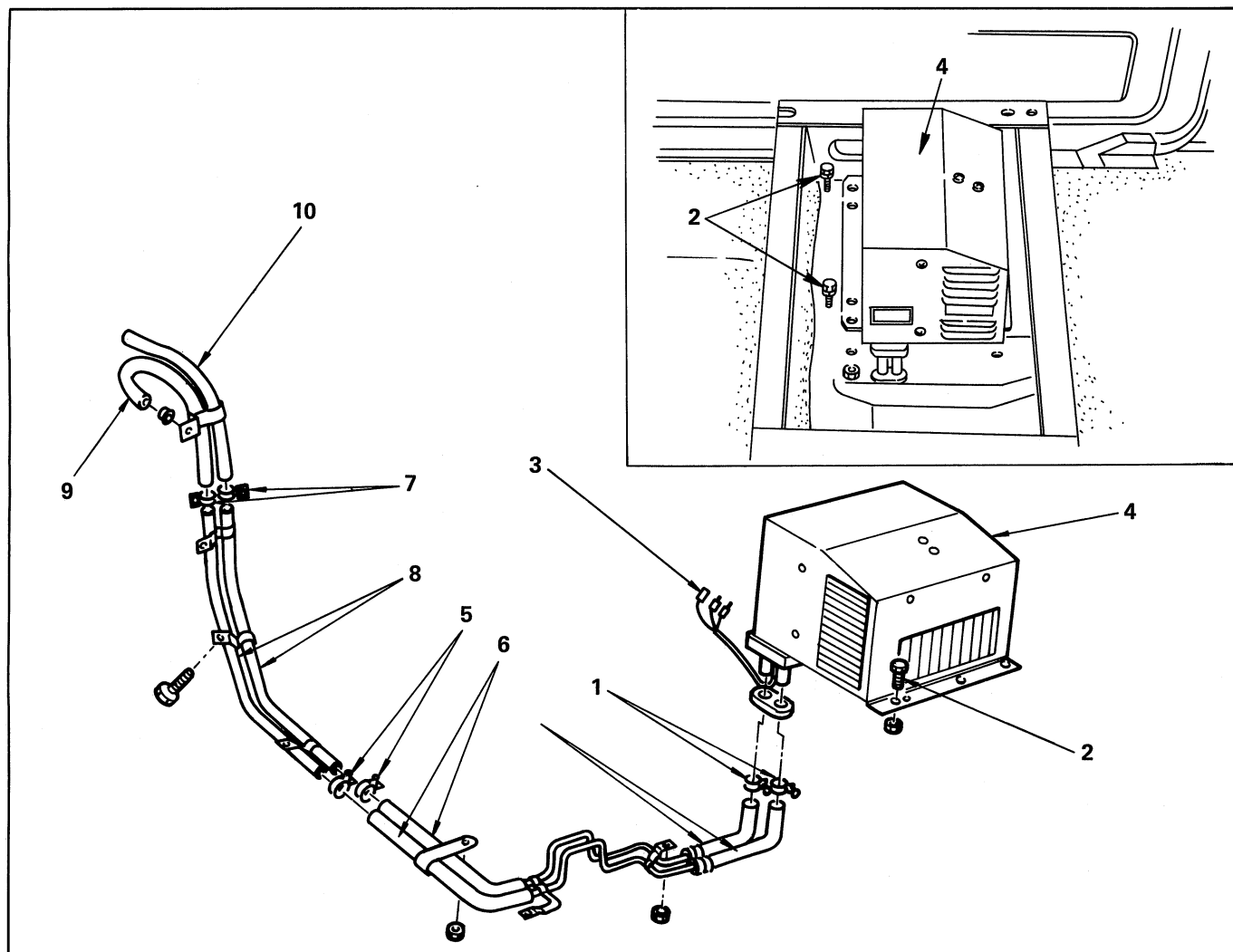
**Blower motor**

Check blower motor is smooth rotating.

REAR HEATER



REMOVAL AND INSTALLATION



Removal steps

★ Before rear heater assembly removal, refer to section 11 "BODY" for assistant seat removal procedure

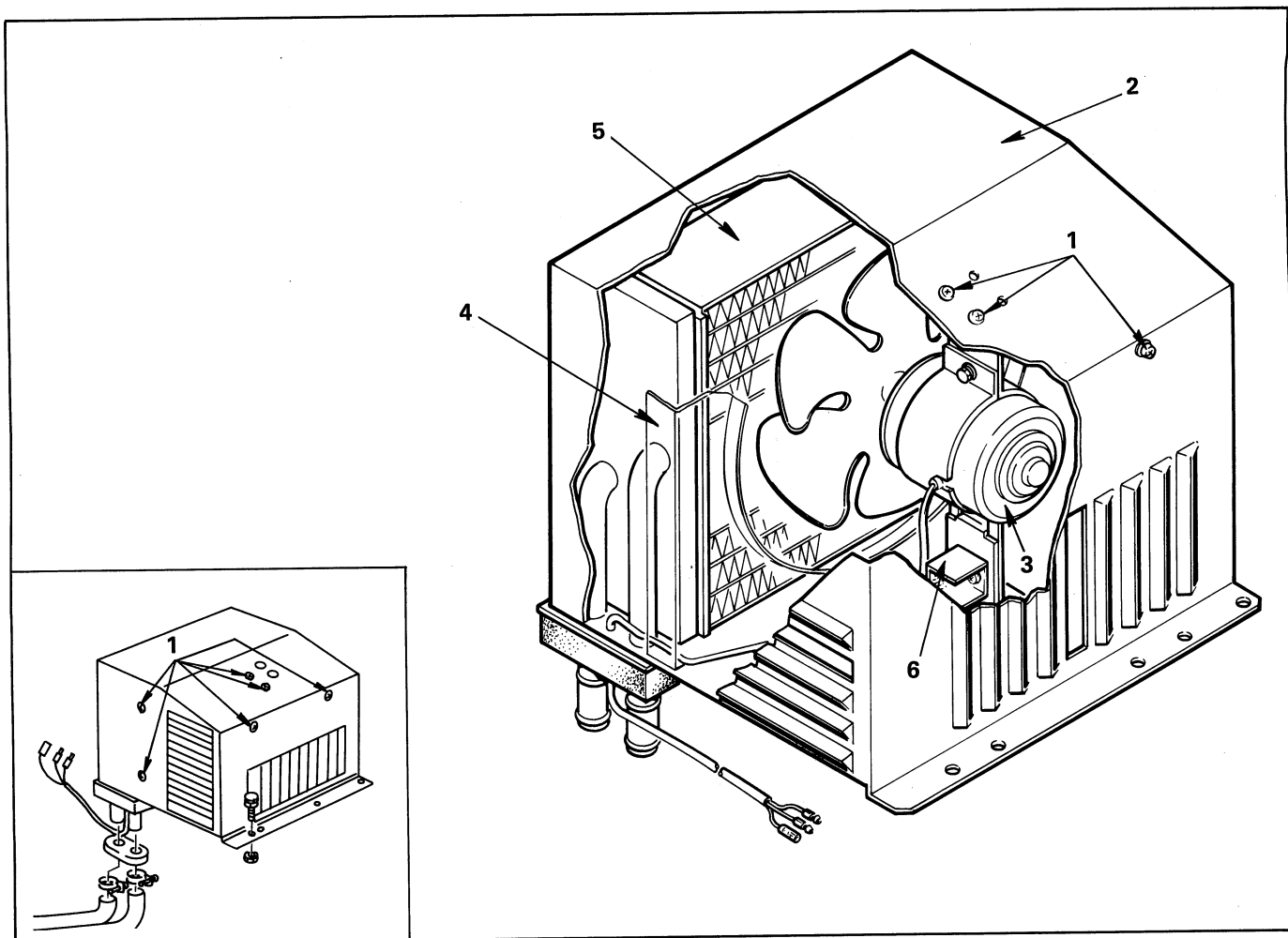
1. Clamp
2. Bolts
3. Connector
4. Rear heater assembly
5. Clamp
6. Hose ; to rear heater
7. Clamp
8. Hose ; center
9. Hose ; front heater unit
10. Hose ; to engine

Installation steps

For installation, follow the removal procedure in reverse order.

REAR HEATER UNITS

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Screws
2. Case
3. Blower motor assembly
4. Guide
5. Core assembly ; rear heater
6. Resistor

Reassembly steps

For installation, follow the disassembly procedure in reverse order.



INSPECTION AND REPAIR

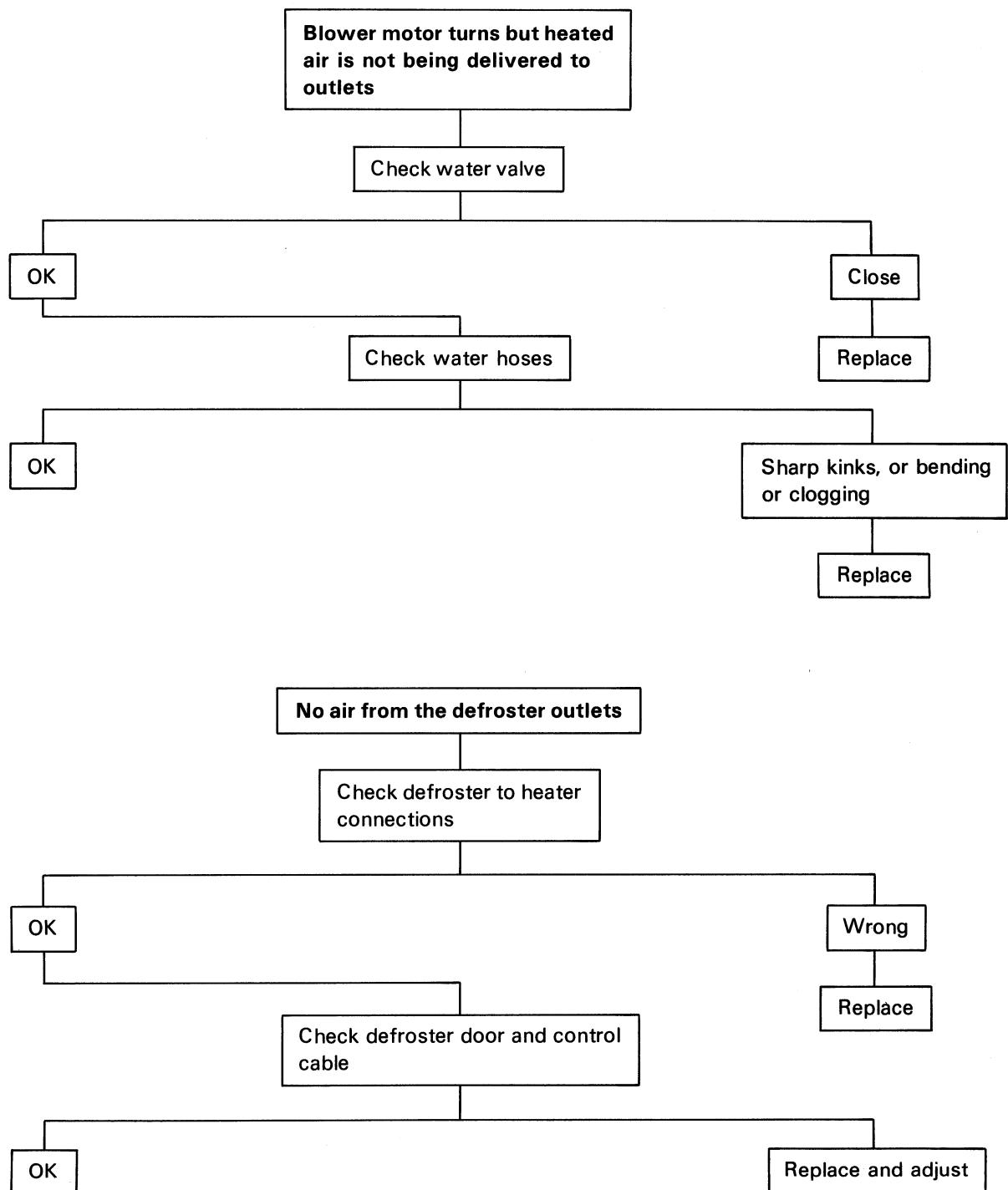
Make all necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

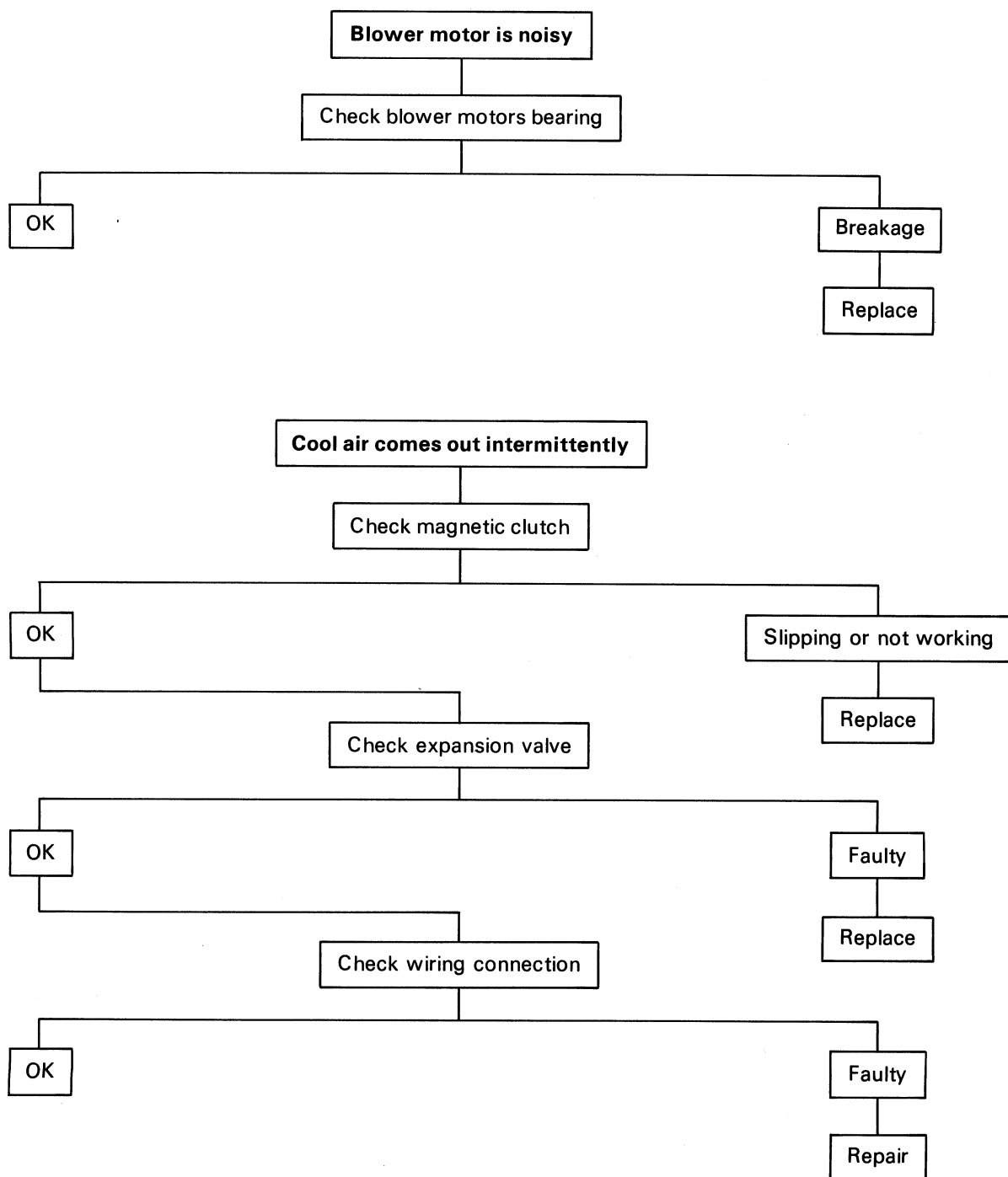
- Hoses
- Blower motor assembly
- Heater core assembly
- Case and guide

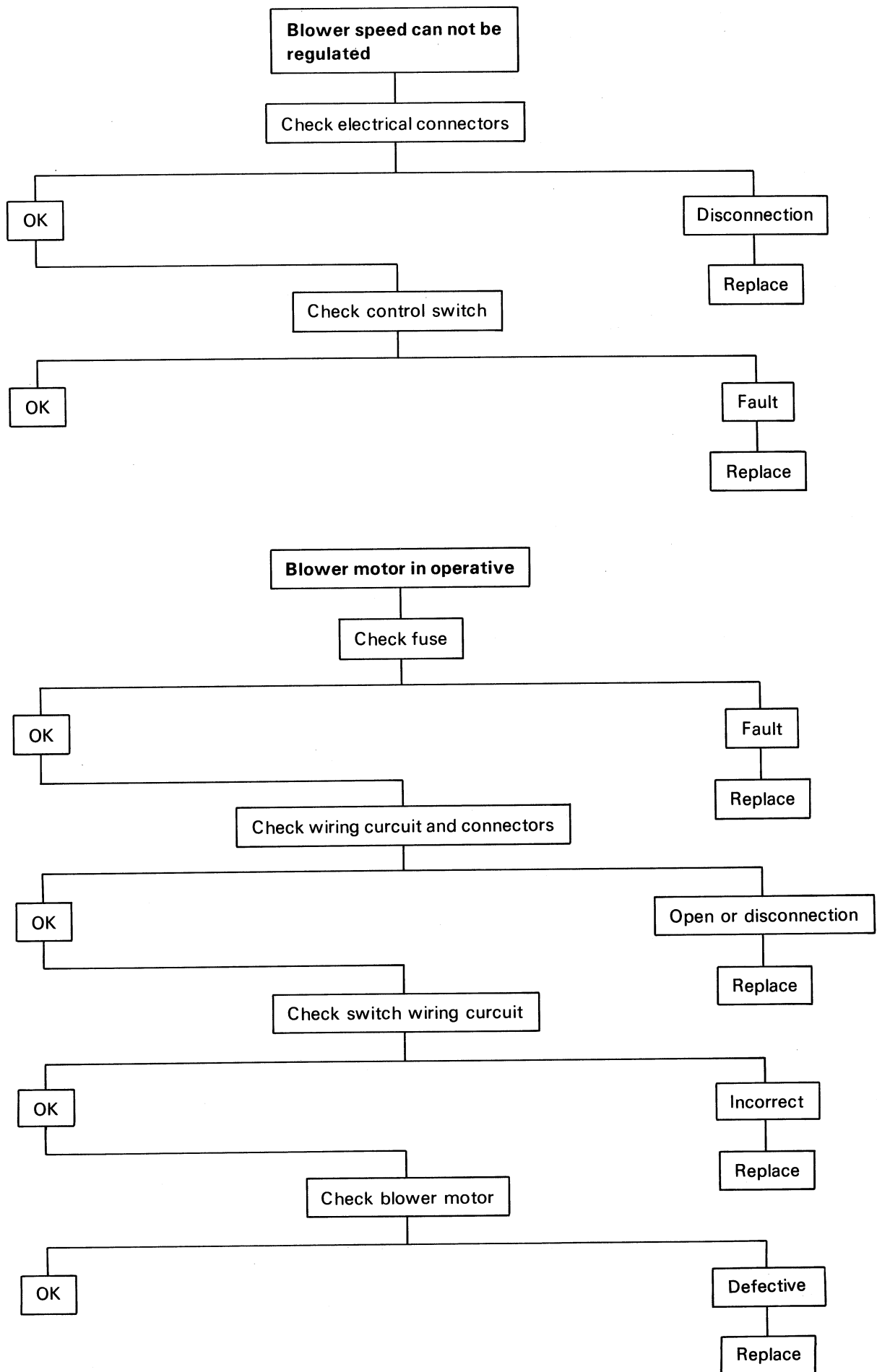
Visual check

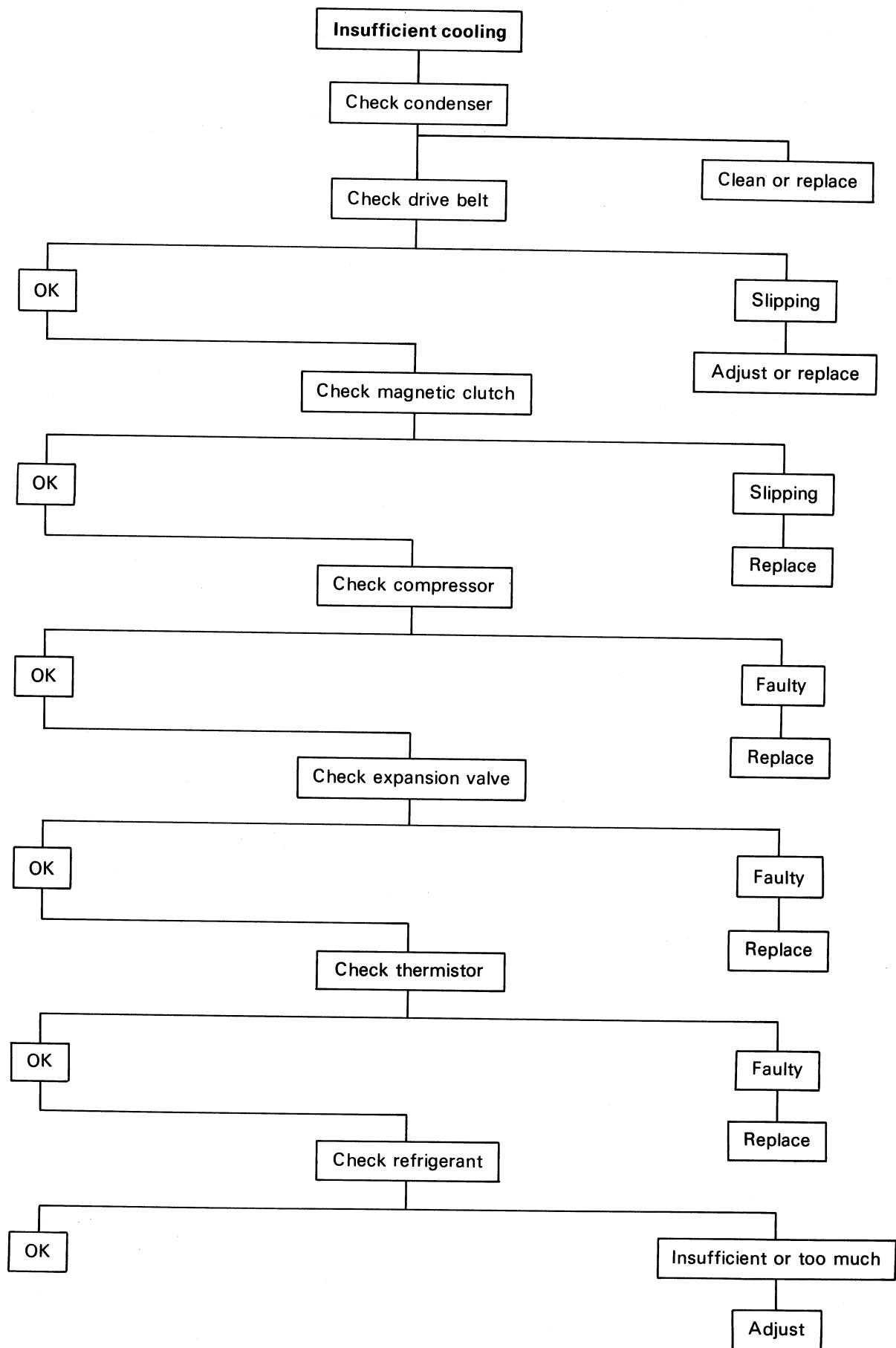
Check the parts for cracks, corrosion or other abnormal conditions.

DIAGNOSIS

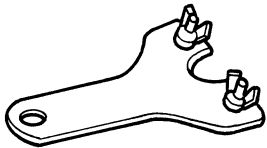
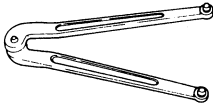
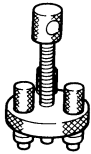
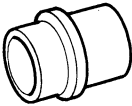
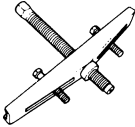
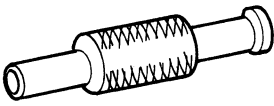
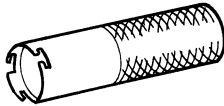
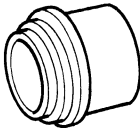
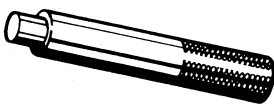






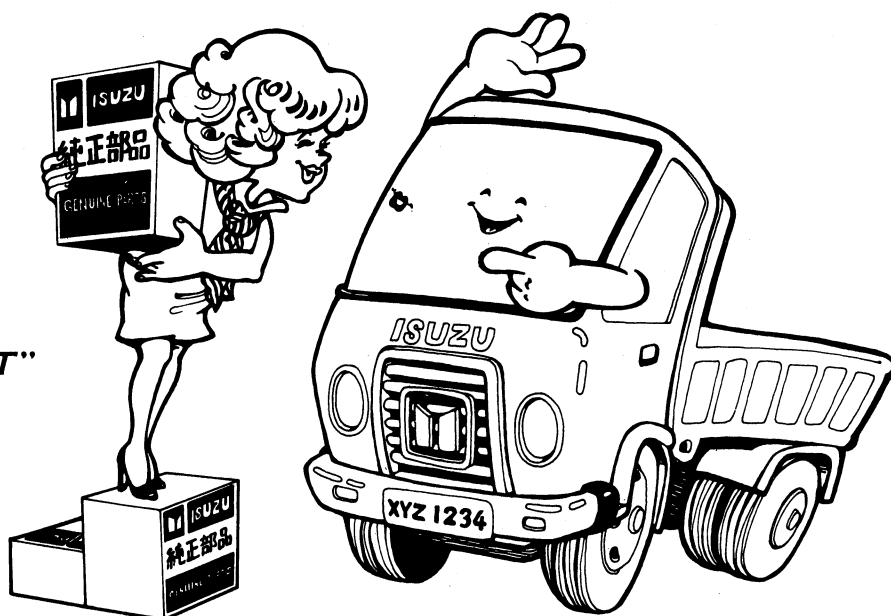


SPECIAL TOOLS

ESSENTIAL OR AVAILABLE	ILLUSTRATION	PARTS NO.	PARTS NAME
		J-33939	Clutch hub holding tool
		J-7624	Clutch hub holding tool
		J-33944	Clutch hub remover
		J-33943	Puller pilot
		J-8433	Pully puller
		J-33942	Seal seat remover & installer
		J-33941	Seal installer & remover
		J-33940	Pulley installer
		J-8092	Grip

MEMO

"QUALITY PARTS
YOU CAN TRUST"



SECTION 13

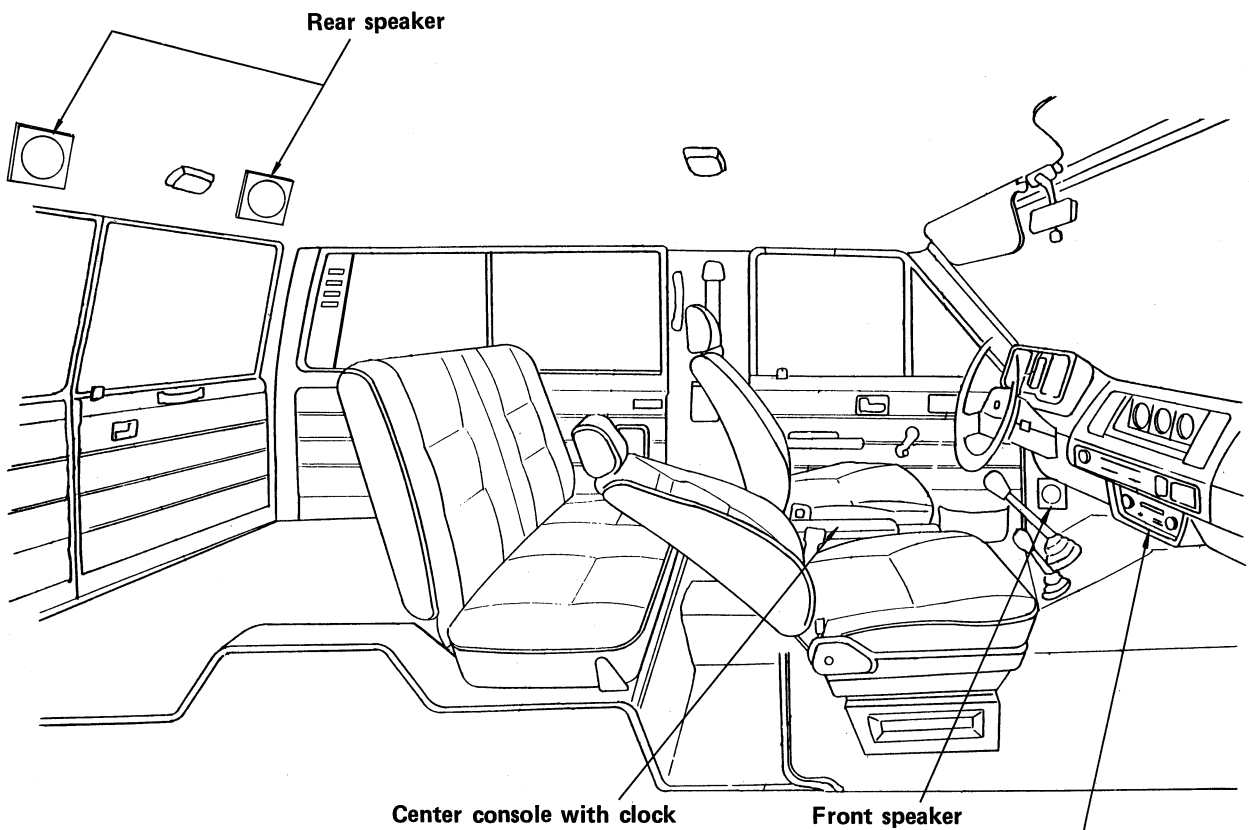
ACCESSORIES

INDEX

CONTENTS	PAGE
General description	13—1
Radio and fixing parts	13—2
Console with clock and fixing parts	13—5

NOT ALL ACCESSORIES ARE AVAILABLE ON ALL MODELS

GENERAL DESCRIPTION



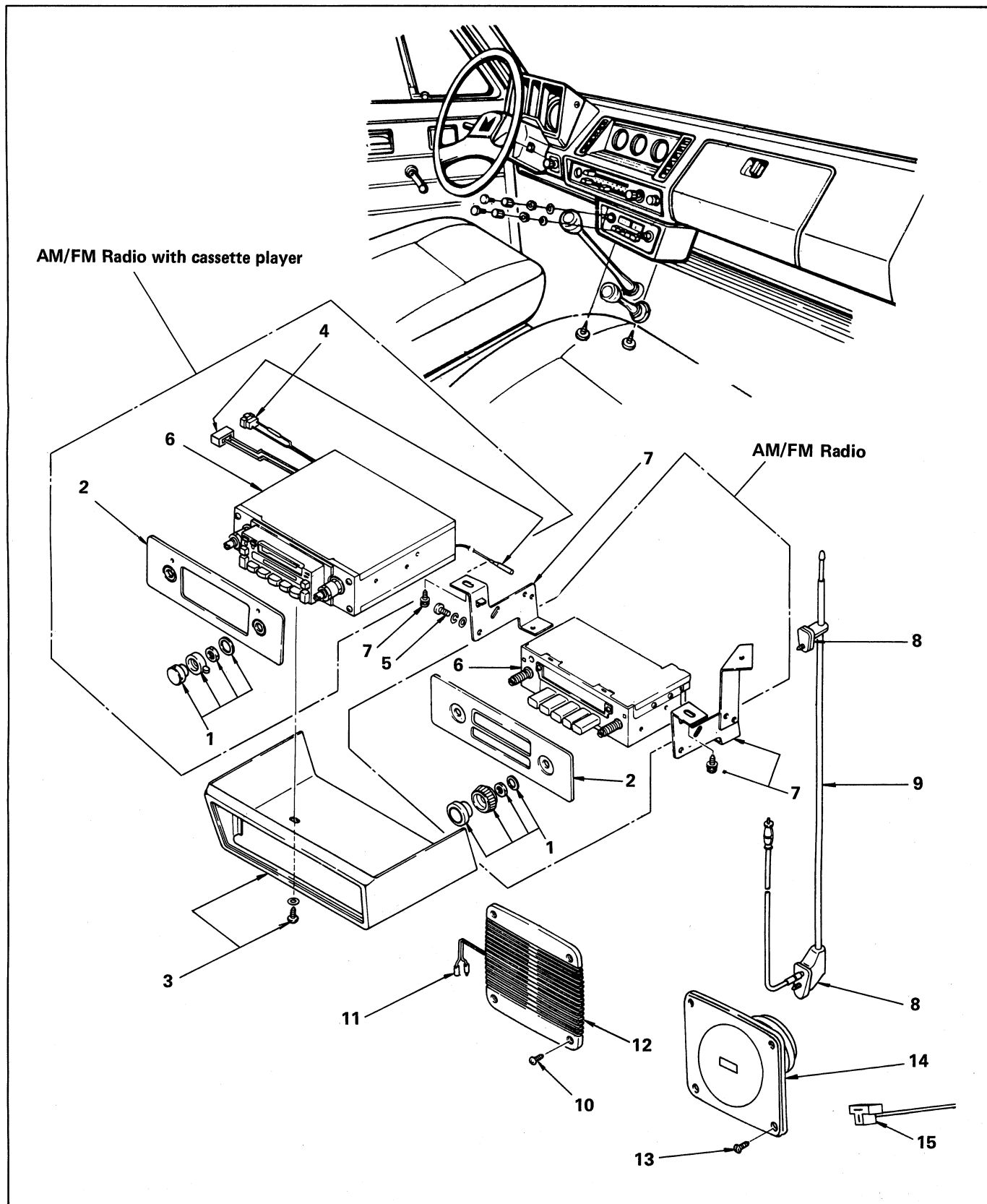
Drawing representative of some models.

AM/FM Radio or AM/FM Radio with cassette player

RADIO AND FIXING PARATS (IF SO EQUIPPED)



REMOVAL AND INSTALLATION



Removal steps

RADIO (AM/FM RADIO OR AM/FM RADIO WITH CASSETTE PLAYER)

1. Knobs, nut and washer
2. Panel assembly
3. Case ; radio and screws
4. Harness connector and feeder cable
5. Screw ; radio fixing
6. Radio assembly
7. Bracket and bolts ; radio

ANTENNA

8. Screws ; antenna
9. Antenna assembly

FRONT SPEAKER

10. Screws ; front speaker
- ▲ 11. Front speaker assembly
- ▲ 12. Harness connector

REAR SPEAKER (AM/FM RADIO WITH CASSETTE PLAYER)

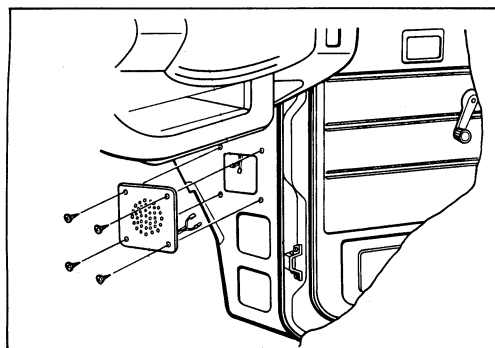
13. Screws ; rear speaker
- ▲ 14. Rear speaker assembly
- ▲ 15. Harness connector

Installation steps

To install, follow the removal steps in the reverse order

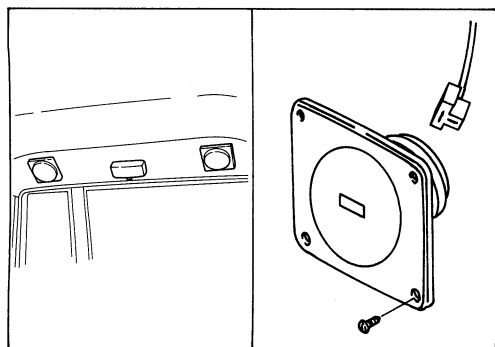


Important operation



11. Front speaker assembly

12. Harness connector



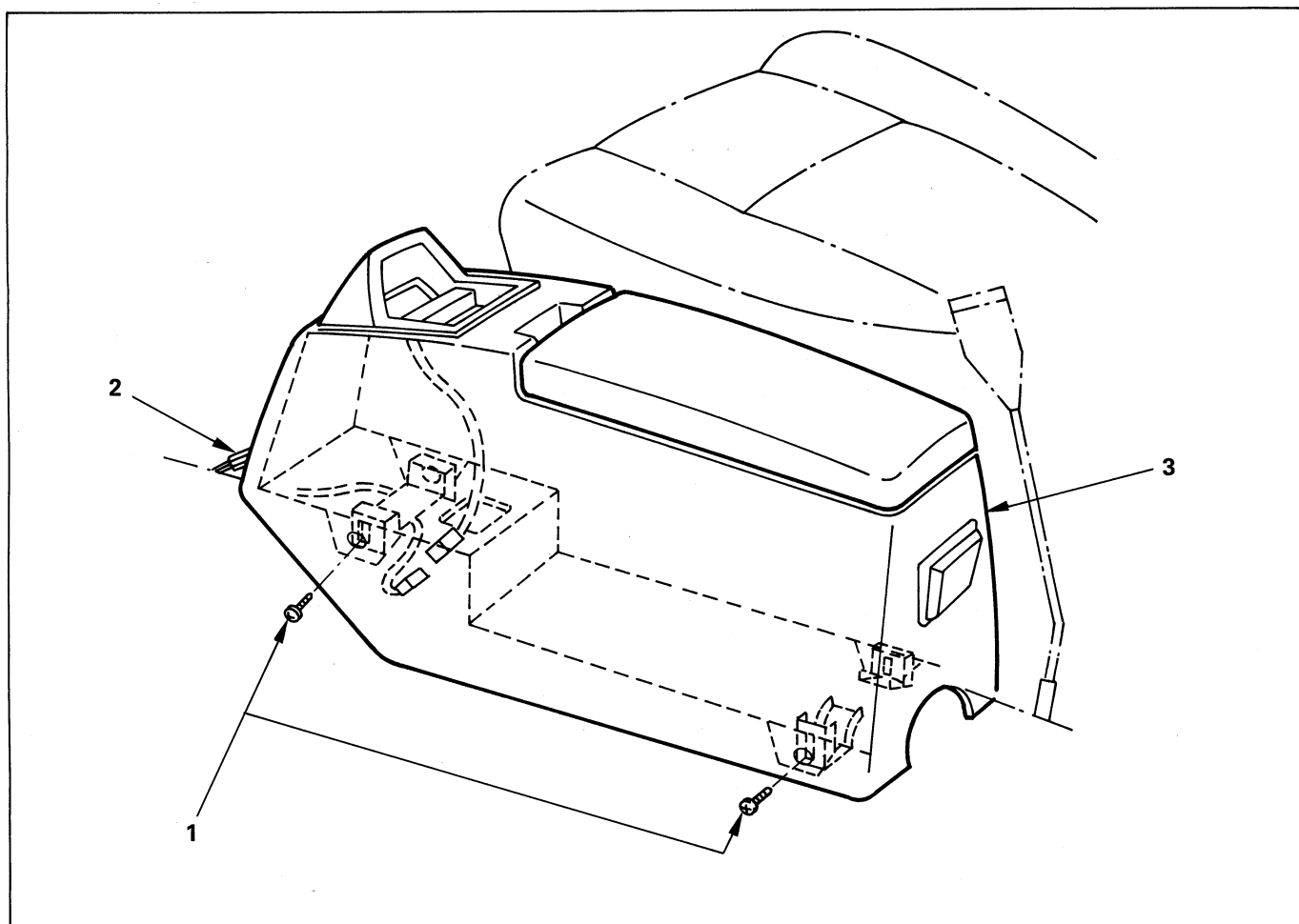
14. Rear speaker assembly

15. Harness connector

CONSOLE WITH CLOCK AND FIXING PARTS (IF SO EQUIPPED)



REMOVAL AND INSTALLATION



Removal steps

1. Screws
2. Connector ; clock
3. Console assembly

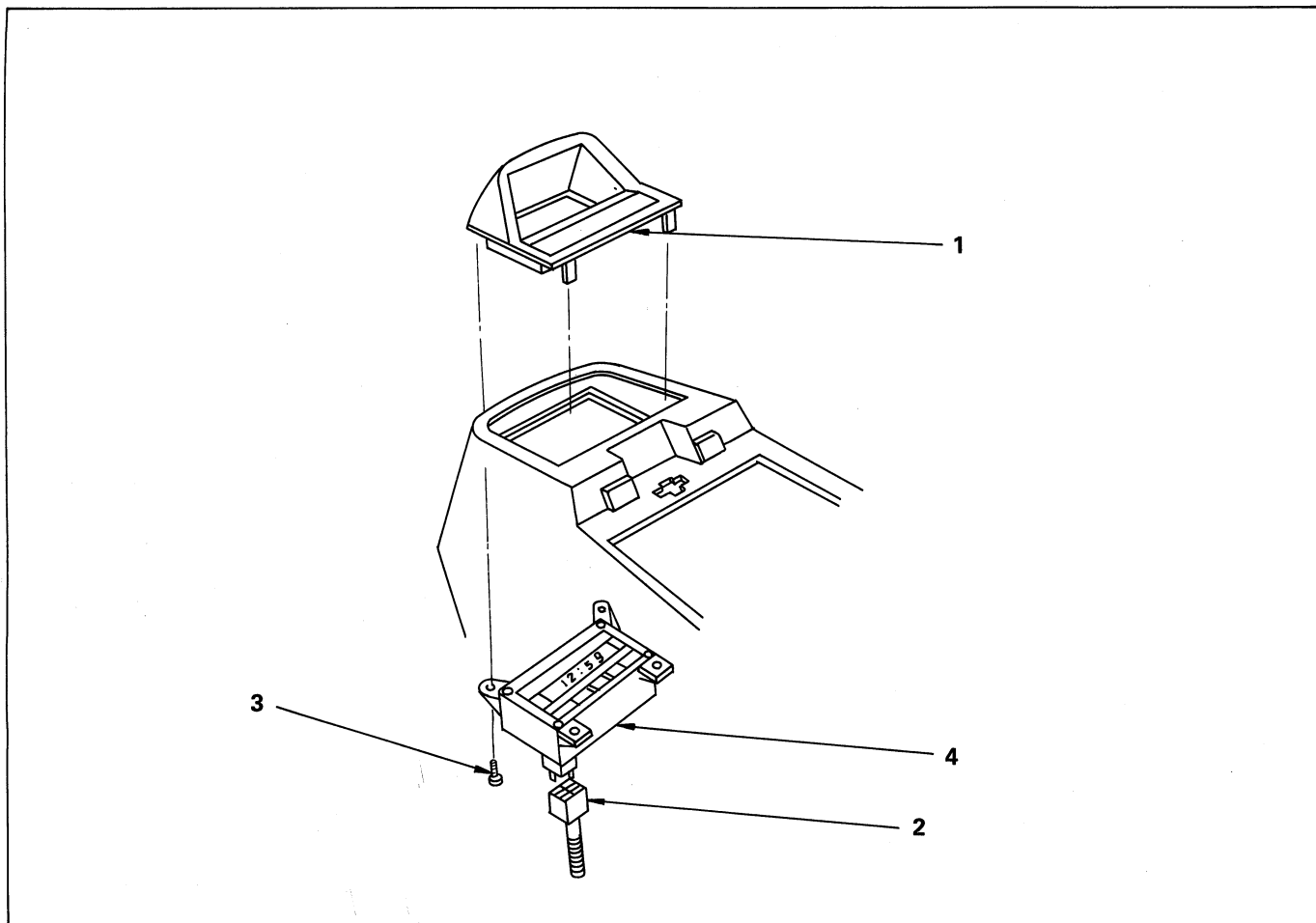
Installation steps

To install, follow the removal steps in the reverse order



DISASSEMBLY AND REASSEMBLY

CLOCK



Disassembly steps

1. Bezel ; clock
2. Connector ; harness
3. Screws ; clock assembly fixing
4. Clock assembly

Reassembly steps

To install, follow the removal steps in the reverse order

APPENDIX A

CONVERSION TABLES

INDEX

CONTENTS	PAGE
Length	A-1
Area	A-3
Volume	A-3
Mass	A-5
Pressure	A-6
Torque	A-7
Temperature	A-8

LENGTH

MILLIMETERS TO INCHES

mm	in.	mm	in.	mm	in.	mm	in.
1	0.0394	26	1.0236	51	2.0079	76	2.9921
2	0.0787	27	1.0630	52	2.0472	77	3.0315
3	0.1181	28	1.1024	53	2.0866	78	3.0709
4	0.1575	29	1.1417	54	2.1260	79	3.1102
5	0.1969	30	1.1811	55	2.1654	80	3.1496
6	0.2362	31	1.2205	56	2.2047	81	3.1890
7	0.2756	32	1.2598	57	2.2441	82	3.2283
8	0.3150	33	1.2992	58	2.2835	83	3.2677
9	0.3543	34	1.3386	59	2.3228	84	3.3071
10	0.3937	35	1.3780	60	2.3622	85	3.3465
11	0.4331	36	1.4173	61	2.4016	86	3.3858
12	0.4724	37	1.4567	62	2.4409	87	3.4252
13	0.5118	38	1.4961	63	2.4803	88	3.4646
14	0.5512	39	1.5354	64	2.5197	89	3.5039
15	0.5906	40	1.5748	65	2.5591	90	3.5433
16	0.6299	41	1.6142	66	2.5984	91	3.5827
17	0.6693	42	1.6535	67	2.6378	92	3.6220
18	0.7087	43	1.6929	68	2.6772	93	3.6614
19	0.7480	44	1.7323	69	2.7165	94	3.7008
20	0.7874	45	1.7717	70	2.7559	95	3.7402
21	0.8268	46	1.8110	71	2.7953	96	3.7795
22	0.8661	47	1.8504	72	2.8346	97	3.8189
23	0.9055	48	1.8898	73	2.8740	98	3.8583
24	0.9449	49	1.9291	74	2.9134	99	3.8976
25	0.9843	50	1.9685	75	2.9528	100	3.9370

INCHES TO MILLIMETERS

in.	mm	in.	mm
1/64	0.3969	33/64	13.0969
1/32	0.7938	17/32	13.4938
3/64	1.1906	35/64	13.8906
1/16	1.5875	9/16	14.2875
5/64	1.9844	37/64	14.6844
3/32	2.3813	19/32	15.0813
7/64	2.7781	39/64	15.4781
1/8	3.1750	5/8	15.8750
9/64	3.5719	41/64	16.2719
5/32	3.9688	21/32	16.6688
11/64	4.3656	43/64	17.0656
3/16	4.7625	11/16	17.4625
13/64	5.1594	45/64	17.8594
7/32	5.5563	23/32	18.2563
15/64	5.9531	47/64	18.6531
1/4	6.3500	3/4	19.0500
17/64	6.7469	49/64	19.4469
9/32	7.1438	25/32	19.8438
19/64	7.5406	51/64	20.2406
5/16	7.9375	13/16	20.6375
21/64	8.3344	53/64	21.0344
11/32	8.7313	27/32	21.4313
23/64	9.1281	55/64	21.8281
3/8	9.5250	7/8	22.2250
25/64	9.9219	57/64	22.6219
13/32	10.3188	29/32	23.0188
27/64	10.7156	59/64	23.4156
7/16	11.1125	15/16	23.8125
29/64	11.5094	61/64	24.2094
15/32	11.9063	31/32	24.6063
31/64	12.3031	63/64	25.0031
1/2	12.7000	1	25.4000

A-2 CONVERSION TABLE

LENGTH

FEET TO METERS

ft.	0	1	2	3	4	5	6	7	8	9	ft.
	m	m	m	m	m	m	m	m	m	m	
—		0.305	0.610	0.914	1.219	1.524	1.829	2.134	2.438	2.743	—
10	3.048	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.486	5.791	10
20	6.096	6.401	6.706	7.010	7.315	7.620	7.925	8.230	8.534	8.839	20
30	9.144	9.449	9.754	10.058	10.363	10.668	10.973	11.278	11.582	11.887	30
40	12.192	12.497	12.802	13.106	13.411	13.716	14.021	14.326	14.630	14.935	40
50	15.240	15.545	15.850	16.154	16.459	16.764	17.069	17.374	17.678	17.983	50
60	18.288	18.593	18.898	19.202	19.507	19.812	20.117	20.422	20.726	21.031	60
70	21.336	21.641	21.946	22.250	22.555	22.860	23.165	23.470	23.774	24.079	70
80	24.384	24.689	24.994	25.298	25.603	25.908	26.213	26.518	26.822	27.127	80
90	27.432	27.737	28.042	28.346	28.651	28.956	29.261	29.566	29.870	30.175	90
100	30.480	30.785	31.090	31.394	31.699	32.004	32.309	32.614	32.918	33.223	100

METERS TO FEET

m	0	1	2	3	4	5	6	7	8	9	m
	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	
—		3.2808	6.5617	9.8425	13.1234	16.4042	19.6850	22.9659	26.2467	29.5276	—
10	32.8084	36.0892	39.3701	42.6509	45.9318	49.2126	52.4934	55.7743	59.0551	62.3360	10
20	65.6168	68.8976	72.1785	75.4593	78.7402	82.0210	85.3018	88.5827	91.8635	95.1444	20
30	98.4252	101.7060	104.9869	108.2677	111.5486	114.8294	118.1102	121.3911	124.6719	127.9528	30
40	131.2336	134.5144	137.7953	141.0761	144.3570	147.6378	150.9186	154.1995	157.4803	160.7612	40
50	164.0420	167.3228	170.6037	173.8845	177.1654	180.4462	183.7270	187.0079	190.2887	193.5696	50
60	196.8504	200.1312	203.4121	206.6929	209.9738	213.2546	216.5354	219.8163	223.0971	226.3780	60
70	229.6588	232.9396	236.2205	239.5013	242.7822	246.0630	249.3438	252.6247	255.9055	259.1864	70
80	262.4672	265.7480	269.0289	272.3097	275.5906	278.8714	282.1522	285.4331	288.7139	291.9948	80
90	295.2756	298.5564	301.8373	305.1181	308.3990	311.6798	314.9606	318.2415	321.5223	324.8032	90
100	328.0840	331.3648	334.6457	337.9265	341.2074	344.4882	347.7690	351.0499	354.3307	357.6116	100

MILES TO KILOMETERS

miles	0	1	2	3	4	5	6	7	8	9	miles
	km	km	km	km	km	km	km	km	km	km	
—		1.609	3.219	4.828	6.437	8.047	9.656	11.265	12.875	14.484	—
10	16.093	17.703	19.312	20.921	22.531	24.140	25.750	27.359	28.968	30.578	10
20	32.187	33.796	35.406	37.015	38.624	40.234	41.843	43.452	45.062	46.671	20
30	48.280	49.890	51.499	53.108	54.718	56.327	57.936	59.546	61.155	62.764	30
40	64.374	65.983	67.592	69.202	70.811	72.420	74.030	75.639	77.249	78.858	40
50	80.467	82.077	83.686	85.295	86.905	88.514	90.123	91.733	93.342	94.951	50
60	96.561	98.170	99.779	101.389	103.000	104.607	106.217	107.826	109.435	111.045	60
70	112.654	114.263	115.873	117.482	119.091	120.700	122.310	123.919	125.529	127.138	70
80	128.748	130.357	131.966	133.576	135.185	136.794	138.404	140.013	141.622	143.232	80
90	144.841	146.450	148.060	149.669	151.278	152.888	154.497	156.106	157.716	159.325	90
100	160.934	162.544	164.153	165.762	167.372	168.981	170.590	172.200	173.809	175.418	100

KILOMETERS TO MILES

km	0	1	2	3	4	5	6	7	8	9	km
	miles	miles	miles	miles	miles	miles	miles	miles	miles	miles	
—		0.621	1.243	1.864	2.485	3.107	3.728	4.350	4.971	5.592	—
10	6.214	6.835	7.456	8.078	8.699	9.321	9.942	10.563	11.185	11.806	10
20	12.427	13.049	13.670	14.292	14.913	15.534	16.156	16.777	17.398	18.020	20
30	18.641	19.262	19.884	20.505	21.127	21.748	22.370	22.990	23.612	24.233	30
40	24.855	25.476	26.098	26.719	27.340	27.962	28.583	29.204	29.826	30.447	40
50	31.065	31.690	32.311	32.933	33.554	34.175	34.797	35.418	36.039	36.661	50
60	37.282	37.904	38.525	39.146	39.768	40.389	41.010	41.632	42.253	42.875	60
70	43.496	44.117	44.739	45.360	45.981	46.603	47.224	47.845	48.467	49.088	70
80	49.711	50.331	50.952	51.574	52.195	52.816	53.438	54.059	54.681	55.302	80
90	55.923	56.545	57.166	57.787	58.409	59.030	59.652	60.273	60.894	61.516	90
100	62.137	62.758	63.380	64.001	64.622	65.244	65.865	66.487	67.108	67.729	100

AREA

SQUARE INCHES TO SQUARE CENTIMETERS

in ²	0	1	2	3	4	5	6	7	8	9	in ²
	cm ²	cm ²	cm ²	cm ²	cm ²	cm ²	cm ²	cm ²	cm ²	cm ²	
—		6.452	12.903	19.355	25.806	32.258	38.710	45.161	51.613	58.064	—
10	64.516	70.968	77.419	83.871	90.322	96.774	103.226	109.677	116.129	122.580	10
20	129.032	135.484	141.935	148.387	154.838	161.290	167.742	174.193	180.645	187.096	20
30	193.548	200.000	206.451	212.903	219.354	225.806	232.258	238.709	245.161	251.612	30
40	258.064	264.516	270.967	277.419	283.870	290.322	296.774	303.225	309.677	316.128	40
50	322.580	329.032	335.483	341.935	348.386	354.838	361.290	367.741	374.193	380.644	50
60	387.096	393.548	399.999	406.451	412.902	419.354	425.806	432.257	438.709	445.160	60
70	451.612	458.064	464.515	470.967	477.418	483.870	490.322	496.773	503.225	509.676	70
80	516.128	522.580	529.031	535.483	541.934	548.386	554.838	561.289	567.741	574.192	80
90	580.644	587.096	593.547	599.999	606.450	612.902	619.354	625.805	632.257	638.708	90
100	645.160	651.612	658.063	664.515	670.966	677.418	683.870	690.312	696.773	703.224	100

SQUARE CENTIMETERS TO SQUARE INCHES

cm ²	0	1	2	3	4	5	6	7	8	9	cm ²
	in ²	in ²	in ²	in ²	in ²	in ²	in ²	in ²	in ²	in ²	
—		0.155	0.310	0.465	0.620	0.775	0.930	1.085	1.240	1.395	—
10	1.550	1.705	1.860	2.015	2.170	2.325	2.480	2.635	2.790	2.945	10
20	3.100	3.255	3.410	3.565	3.720	3.875	4.030	4.185	4.340	4.495	20
30	4.650	4.805	4.960	5.115	5.270	5.425	5.580	5.735	5.890	6.045	30
40	6.200	6.355	6.510	6.665	6.820	6.975	7.130	7.285	7.440	7.595	40
50	7.750	7.905	8.060	8.215	8.370	8.525	8.680	8.835	8.990	9.145	50
60	9.300	9.455	9.610	9.765	9.920	10.075	10.230	10.385	10.540	10.695	60
70	10.850	11.005	11.160	11.315	11.470	11.625	11.780	11.935	12.090	12.245	70
80	12.400	12.555	12.710	12.865	13.020	13.175	13.330	13.485	13.640	13.795	80
90	13.950	14.105	14.260	14.415	14.570	14.725	14.880	15.035	15.190	15.345	90
100	15.500	15.655	15.810	15.965	16.120	16.275	16.430	16.583	16.740	16.895	100

VOLUME

CUBIC INCHES TO CUBIC CENTIMETERS

in ³	0	1	2	3	4	5	6	7	8	9	in ³
	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	cm ³ (cc)	
—		16.387	32.774	49.161	65.548	81.935	98.322	114.709	131.097	147.484	—
10	163.871	180.258	196.645	213.032	229.419	245.806	262.193	278.580	294.967	311.354	10
20	327.741	344.128	360.515	376.902	393.290	409.677	426.064	442.451	458.838	475.225	20
30	491.612	507.999	524.386	540.773	557.160	573.547	589.934	606.321	622.708	639.095	30
40	655.483	671.870	688.257	704.644	721.031	737.418	753.805	770.192	786.579	802.966	40
50	819.353	835.740	852.127	868.514	884.901	901.289	917.676	934.063	950.450	966.837	50
60	983.224	999.611	1015.998	1032.385	1048.772	1065.159	1081.546	1097.933	1114.320	1130.707	60
70	1147.094	1163.482	1179.869	1196.256	1212.643	1229.030	1245.417	1261.804	1278.191	1294.578	70
80	1310.965	1327.352	1343.739	1360.126	1376.513	1392.900	1409.288	1425.675	1442.062	1458.449	80
90	1474.836	1491.223	1507.610	1523.997	1540.384	1556.771	1573.158	1589.545	1605.932	1622.319	90
100	1638.706	1655.093	1671.481	1687.868	1704.255	1720.642	1737.029	1753.416	1769.803	1786.190	100

CUBIC CENTIMETERS TO CUBIC INCHES

cm ³ (cc)	0	1	2	3	4	5	6	7	8	9	cm ³ (cc)
	in ³	in ³	in ³	in ³	in ³	in ³	in ³	in ³	in ³	in ³	
—		0.0610	0.1220	0.1831	0.2441	0.3051	0.3661	0.4272	0.4882	0.5492	—
10	0.6102	0.6713	0.7323	0.7933	0.8543	0.9153	0.9764	1.0374	1.0984	1.1594	10
20	1.2205	1.2815	1.3425	1.4035	1.4646	1.5256	1.5866	1.6476	1.7086	1.7697	20
30	1.8307	1.8917	1.9527	2.0138	2.0748	2.1358	2.1968	2.2579	2.3189	2.3799	30
40	2.4409	2.5020	2.5630	2.6240	2.6850	2.7460	2.8071	2.8681	2.9291	2.9901	40
50	3.0512	3.1122	3.1732	3.2342	3.2952	3.3563	3.4173	3.4783	3.5393	3.6004	50
60	3.6614	3.7224	3.7834	3.8444	3.9055	3.9665	4.0275	4.0885	4.1496	4.2106	60
70	4.2716	4.3326	4.3937	4.4547	4.5157	4.5767	4.6377	4.6988	4.7598	4.8208	70
80	4.8818	4.9429	5.0039	5.0649	5.1259	5.1870	5.2480	5.3090	5.3700	5.4310	80
90	5.4921	5.5531	5.6141	5.6751	5.7362	5.7972	5.8582	5.9192	5.9803	6.0413	90
100	6.1023	6.1633	6.2243	6.2854	6.3464	6.4074	6.4684	6.5295	6.5905	6.6515	100

A-4 CONVERSION TABLE

VOLUME

GALLONS (U. S.) TO LITERS

U.S. gal.	0	1	2	3	4	5	6	7	8	9	U.S. gal.
	liters	liters	liters	liters	liters	liters	liters	liters	liters	liters	
—		3.7854	7.5709	11.3563	15.1417	18.9271	22.7126	26.4980	30.2834	34.0633	—
10	37.8543	41.6397	45.4251	49.2105	52.9960	56.7814	60.5668	64.3523	68.1377	71.9231	10
20	75.7085	79.4940	83.2794	87.0648	90.8502	94.6357	98.4211	102.2065	105.9920	109.7774	20
30	113.5629	117.3482	121.1337	124.9191	128.7045	132.4901	136.2754	140.0608	143.8462	147.6316	30
40	151.4171	155.2025	158.9879	162.7734	166.5588	170.3442	174.1296	177.9151	181.7005	185.4859	40
50	189.2713	193.0568	196.8422	200.6276	204.4131	208.1985	211.9839	215.7693	219.5548	223.3402	50
60	227.1256	230.9110	234.6965	238.4819	242.2673	246.0527	249.8382	253.6236	257.4090	261.1945	60
70	264.9799	268.7653	272.5507	276.3362	280.1216	283.9070	287.6924	291.4779	295.2633	299.0487	70
80	302.8342	306.6196	310.4050	314.1904	317.9759	321.7613	325.5467	329.3321	333.1176	336.9030	80
90	340.6884	344.4738	348.2593	352.0447	355.8301	359.6156	363.4010	367.1864	370.9718	374.7573	90
100	378.5427	382.3281	386.1135	389.8990	393.6844	397.4698	401.2553	405.0407	408.8261	412.6115	100

LITERS TO GALLONS (U.S.)

liters	0	1	2	3	4	5	6	7	8	9	liters
	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	
—		0.2642	0.5283	0.7925	1.0567	1.3209	1.5850	1.8492	2.1134	2.3775	—
10	2.6417	2.9059	3.1701	3.4342	3.6984	3.9626	4.2268	4.4909	4.7551	5.0193	10
20	5.2834	5.5476	5.8118	6.0760	6.3401	6.6043	6.8685	7.1326	7.3968	7.6610	20
30	7.9252	8.1893	8.4535	8.7177	8.9818	9.2460	9.5102	9.7743	10.0385	10.3027	30
40	10.5669	10.8311	11.0952	11.3594	11.6236	11.8877	12.1519	12.4161	12.6803	12.9444	40
50	13.2086	13.4728	13.7369	14.0011	14.2653	14.5295	14.7936	15.0578	15.3220	15.5861	50
60	15.8503	16.1145	16.3787	16.6428	16.9070	17.1711	17.4354	17.6995	17.9637	18.2279	60
70	18.4920	18.7562	19.0204	19.2846	19.5487	19.8129	20.0771	20.3412	20.6054	20.8696	70
80	21.1338	21.3979	21.6621	21.9263	22.1904	22.4546	22.7188	22.9830	23.2471	23.5113	80
90	23.7755	24.0397	24.3038	24.5680	24.8322	25.0963	25.3605	25.6247	25.8889	26.1530	90
100	26.4172	26.6814	26.9455	27.2097	27.4739	27.7381	28.0022	28.2664	28.5306	28.7947	100

GALLONS (IMP.) TO LITERS

Imp gal.	0	1	2	3	4	5	6	7	8	9	Imp gal.
	liters	liters	liters	liters	liters	liters	liters	liters	liters	liters	
—		4.5459	9.0918	13.6377	18.1836	22.7295	27.2754	31.8213	36.3672	40.9131	—
10	45.4590	50.0049	54.5508	59.0967	63.6426	68.1885	72.7344	77.2803	81.8262	86.3721	10
20	90.9180	95.4639	100.0098	104.5557	109.1016	113.6475	118.1934	122.7393	127.2852	131.8311	20
30	136.3770	140.9229	145.4688	150.0147	154.5606	159.1065	163.6524	168.1983	172.7442	177.2901	30
40	181.8360	186.3819	190.9278	195.4737	200.0196	204.5655	209.1114	213.6573	218.2032	222.7491	40
50	227.2950	231.8409	236.3868	240.9327	245.4786	250.0245	254.5704	259.1163	263.6622	268.2081	50
60	272.7540	277.2999	281.8458	286.3917	290.9376	295.4835	300.0294	304.5753	309.1212	313.6671	60
70	318.2130	322.7589	327.3048	331.8507	336.3966	340.9425	345.4884	350.0343	354.5802	359.1261	70
80	363.6720	368.2179	372.7638	377.3097	381.8556	386.4015	390.9474	395.4933	400.0392	404.5851	80
90	409.1310	413.6769	418.2228	422.7687	427.3146	431.8605	436.4064	440.9523	445.4982	450.0441	90
100	454.5900	459.1359	463.6818	468.2277	472.7736	477.3195	481.8654	486.4113	490.9572	495.5031	100

LITERS TO GALLONS (IMP.)

liters	0	1	2	3	4	5	6	7	8	9	liter
	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	gal.	
—		0.2200	0.4400	0.6599	0.8799	1.0999	1.3199	1.5399	1.7598	1.9798	—
10	2.1998	2.4198	2.6398	2.8597	3.0797	3.2997	3.5197	3.7397	3.9596	4.1796	10
20	4.3996	4.6196	4.8396	5.0595	5.2795	5.4995	5.7195	5.9395	6.1594	6.3794	20
30	6.5994	6.8194	7.0394	7.2593	7.4793	7.6993	7.9193	8.1393	8.3592	8.5792	30
40	8.7992	9.0192	9.2392	9.4591	9.6791	9.8991	10.1191	10.3391	10.5590	10.7790	40
50	10.9990	11.2190	11.4390	11.6590	11.8789	12.0989	12.3189	12.5389	12.7588	12.9788	50
60	13.1988	13.4188	13.6388	13.8587	14.0787	14.2987	14.5187	14.7387	14.9586	15.1786	60
70	15.3986	15.6186	15.8386	16.0585	16.2785	16.4985	16.7185	16.9385	17.1584	17.3784	70
80	17.5984	17.8184	18.0384	18.2583	18.4783	18.6983	18.9183	19.1383	19.3582	19.5782	80
90	19.7982	20.0182	20.2382	20.4581	20.6781	20.8981	21.1181	21.3381	21.5580	21.7780	90
100	21.9980	22.2180	22.4380	22.6579	22.8779	23.0979	23.3179	23.5379	23.7578	23.9778	100

MASS

POUNDS TO KILOGRAMS

lbs.	0	1	2	3	4	5	6	7	8	9	lbs.
	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	
—		0.454	0.907	1.361	1.814	2.268	2.722	3.175	3.629	4.082	—
10	4.536	4.990	5.443	5.897	6.350	6.804	7.257	7.711	8.165	8.618	10
20	9.072	9.525	9.979	10.433	10.886	11.340	11.793	12.247	12.701	13.154	20
30	13.608	14.061	14.515	14.969	15.422	15.876	16.329	16.783	17.237	17.690	30
40	18.144	18.597	19.051	19.504	19.958	20.412	20.865	21.319	21.772	22.226	40
50	22.680	23.133	23.587	24.040	24.494	24.948	25.401	25.855	26.308	26.762	50
60	27.216	27.669	28.123	28.576	29.030	29.484	29.937	30.391	30.844	31.298	60
70	31.751	32.205	32.659	33.112	33.566	34.019	34.473	34.927	35.380	35.834	70
80	36.287	36.741	37.195	37.648	38.102	38.555	39.009	39.463	39.916	40.370	80
90	40.823	41.277	41.731	42.184	42.638	43.091	43.545	43.998	44.452	44.906	90
100	45.359	45.813	46.266	46.720	47.174	47.627	47.081	48.534	48.988	49.442	100

KILOGRAMS TO POUNDS

kg	0	1	2	3	4	5	6	7	8	9	kg
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
—		2.205	4.409	6.614	8.818	11.023	13.228	15.432	17.637	19.842	—
10	22.046	24.251	26.455	28.660	30.865	33.069	35.274	37.479	39.683	41.888	10
20	44.092	46.297	48.502	50.706	52.911	55.116	57.320	59.525	61.729	63.934	20
30	66.139	68.343	70.548	72.753	74.957	77.162	79.366	81.571	83.776	85.980	30
40	88.185	90.390	92.594	94.799	97.003	99.208	101.413	103.617	105.822	108.026	40
50	110.231	112.436	114.640	116.845	119.050	121.254	123.459	125.633	127.868	130.073	50
60	132.277	134.482	136.687	138.891	141.096	143.300	145.505	147.710	149.914	152.119	60
70	154.324	156.528	158.732	160.937	163.142	165.347	167.551	169.756	171.961	174.165	70
80	176.370	178.574	180.780	182.984	185.188	187.393	189.597	191.802	194.007	196.211	80
90	198.416	200.621	202.825	205.030	207.234	209.439	211.644	213.848	216.053	218.258	90
100	220.462	222.667	224.871	227.076	229.281	231.485	233.690	235.895	238.099	240.304	100

KILOGRAMS TO NEWTON

kg	0	1	2	3	4	5	6	7	8	9	kg
	N	N	N	N	N	N	N	N	N	N	
—	—	9.81	19.61	29.42	39.23	49.03	58.84	68.65	78.45	88.26	—
10	98.07	107.87	117.68	127.49	137.29	147.10	156.91	166.71	176.52	186.33	10
20	196.13	205.94	215.75	225.55	235.36	245.17	254.97	264.78	274.59	284.39	20
30	294.20	304.01	313.81	323.62	333.43	343.23	353.04	362.85	372.65	382.46	30
40	392.27	402.07	411.88	421.69	431.49	441.30	451.11	460.91	470.72	480.53	40
50	490.33	500.14	509.95	519.75	529.56	539.37	549.17	558.98	568.79	578.59	50
60	558.40	598.21	608.01	617.82	627.63	637.43	647.24	657.05	666.85	676.66	60
70	686.47	696.27	706.08	715.89	725.69	735.50	745.31	755.11	764.92	774.73	70
80	784.53	794.34	804.15	813.95	823.76	833.57	843.37	853.18	862.99	872.79	80
90	882.60	892.41	902.21	912.02	921.83	931.63	941.44	951.25	961.05	970.86	90
100	980.67	990.47	1000.28	1010.08	1019.89	1029.70	1039.50	1049.31	1059.12	1068.92	100

NEWTON TO KILOGRAMS

N	0	10	20	30	40	50	60	70	80	90	N
	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	
—	—	1.020	2.039	3.059	4.079	5.099	6.118	7.138	8.158	9.177	—
100	10.197	11.217	12.237	13.256	14.276	15.296	16.316	17.335	18.355	19.375	100
200	20.394	21.414	22.434	23.453	24.473	25.493	26.513	27.532	28.552	29.572	200
300	30.592	31.611	32.631	33.651	34.670	35.690	36.710	37.730	38.749	39.769	300
400	40.789	41.809	42.828	43.848	44.868	45.887	46.907	47.927	48.947	49.966	400
500	50.986	52.006	53.025	54.045	55.065	56.085	57.104	58.124	59.144	60.163	500
600	61.183	62.203	63.223	64.242	65.262	66.282	67.302	68.321	69.341	70.361	600
700	71.380	72.400	73.420	74.440	75.459	76.479	77.499	78.518	79.538	80.558	700
800	81.578	82.597	83.617	84.637	85.656	86.676	87.696	88.716	89.735	90.755	800
900	91.775	92.795	93.814	94.834	95.854	96.873	97.893	98.913	99.933	100.952	900
1000	101.972	102.992	104.011	105.031	106.051	107.071	108.090	109.110	110.130	111.149	1000

A-6 CONVERSION TABLE

PRESSURE

POUNDS PER SQUARE INCHES TO KILOGRAMS PER SQUARE CENTIMETERS

lb/in ²	0	1	2	3	4	5	6	7	8	9	lb/in ²
(psi)	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	(psi)
—		0.0703	0.1406	0.2109	0.2812	0.3515	0.4218	0.4921	0.5625	0.6328	—
10	0.7031	0.7734	0.8437	0.9140	0.9843	1.0546	1.1249	1.1952	1.2655	1.3358	10
20	1.4061	1.4764	1.5468	1.6171	1.6874	1.7577	1.8280	1.8983	1.9686	2.0389	20
30	2.1092	2.1795	2.2498	2.3201	2.3904	2.4607	2.5311	2.6014	2.6717	2.7420	30
40	2.8123	2.8826	2.9529	3.0232	3.0935	3.1638	3.2341	3.3044	3.3747	3.4450	40
50	3.5154	3.5857	3.6560	3.7263	3.7966	3.8669	3.9372	4.0075	4.0778	4.1481	50
60	4.2184	4.2887	4.3590	4.4293	4.4996	4.5700	4.6403	4.7106	4.7809	4.8512	60
70	4.9215	4.9918	5.0621	5.1324	5.2027	5.2730	5.3433	5.4136	5.4839	5.5543	70
80	5.6246	5.6947	5.7652	5.8355	5.9058	5.9761	6.0464	6.1167	6.1870	6.2573	80
90	6.3276	6.3979	6.4682	6.5386	6.6089	6.6792	6.7495	6.8198	6.8901	6.9604	90
100	7.0307	7.1010	7.1713	7.2416	7.3119	7.3822	7.4525	7.5228	7.5932	7.6635	100

KILOGRAMS PER SQUARE CENTIMETERS TO POUNDS PER SQUARE INCHES

kg/cm ²	0	1	2	3	4	5	6	7	8	9	kg/cm ²
	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	lb/in ² (psi)	
—		14.22	28.45	42.67	56.89	71.12	85.34	99.56	113.78	128.01	—
10	142.23	156.45	170.68	184.90	199.12	213.35	227.57	241.79	256.01	270.24	10
20	284.46	298.68	312.91	327.13	341.35	355.58	369.80	384.02	398.24	412.47	20
30	426.69	440.91	455.14	469.36	483.58	497.81	512.03	526.25	540.47	554.70	30
40	568.92	583.14	597.37	611.59	625.81	640.04	654.26	668.48	682.70	696.93	40
50	711.16	725.37	739.60	753.82	768.04	782.27	796.49	810.71	824.93	839.16	50
60	853.38	867.60	881.83	896.05	910.27	924.50	938.72	952.94	967.16	981.39	60
70	995.61	1009.83	1024.06	1038.28	1052.50	1066.73	1080.95	1095.17	1109.39	1123.62	70
80	1137.84	1152.06	1166.27	1180.51	1194.73	1208.96	1223.18	1237.40	1251.62	1265.85	80
90	1280.07	1294.20	1308.52	1322.74	1336.96	1351.19	1365.41	1379.63	1393.85	1408.08	90
100	1422.30	1436.52	1450.75	1464.97	1479.19	1493.42	1507.64	1521.86	1536.08	1550.31	100

KILOGRAMS PER SQUARE CENTIMETERS TO KILO PASCAL

kg/cm ²	0	1	2	3	4	5	6	7	8	9	kg/cm ²
	KPa	KPa	KPa	KPa	KPa	KPa	KPa	KPa	KPa	KPa	
—	—	98.1	196.1	294.2	392.3	490.3	588.4	686.5	784.5	882.6	—
10	980.7	1078.7	1176.8	1274.9	1372.9	1471.0	1569.1	1667.1	1765.2	1863.3	10
20	1961.3	2059.4	2157.5	2255.5	2353.6	2451.7	2549.7	2647.8	2745.9	2843.9	20
30	2942.0	3040.1	3138.1	3236.2	3334.3	3432.3	3530.4	3628.5	3726.5	3824.6	30
40	3922.7	4020.7	4118.8	4216.9	4314.9	4413.0	4511.1	4609.1	4707.2	4805.3	40
50	4903.3	5001.4	5099.5	5197.5	5295.6	5393.7	5491.7	5589.8	5687.9	5785.9	50
60	5884.0	5982.1	6080.1	6178.2	6276.3	6374.3	6472.4	6570.5	6668.5	6766.6	60
70	6864.7	6962.7	7060.8	7158.9	7256.9	7355.0	7453.1	7551.1	7649.2	7747.3	70
80	7845.3	7943.4	8041.5	8139.5	8237.6	8335.7	8433.7	8531.8	8629.9	8727.9	80
90	8826.0	8924.1	9022.1	9120.2	9218.3	9316.3	9414.4	9512.5	9610.5	9708.6	90
100	9806.7	9904.7	10002.8	10100.8	10198.9	10297.0	10395.0	10493.1	10591.2	10689.2	100

KILO PASCAL TO KILOGRAMS PER SQUARE CENTIMETERS

KPa	0	100	200	300	400	500	600	700	800	900	KPa
	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	
—	—	1.020	2.039	3.059	4.079	5.099	6.118	7.138	8.158	9.177	—
1000	10.197	11.217	12.237	13.256	14.276	15.296	16.316	17.335	18.355	19.375	1000
2000	20.394	21.414	22.434	23.453	24.473	25.493	26.513	27.532	28.552	29.572	2000
3000	30.592	31.611	32.631	33.651	34.670	35.690	36.710	37.730	38.749	39.769	3000
4000	40.789	41.809	42.828	43.848	44.868	45.887	46.907	47.927	48.947	49.966	4000
5000	50.986	52.006	53.025	54.045	55.065	56.085	57.104	58.124	59.144	60.163	5000
6000	61.183	62.203	63.223	64.242	65.262	66.282	67.302	68.321	69.341	70.361	6000
7000	71.380	72.400	73.420	74.440	75.459	76.479	77.499	78.518	79.538	80.558	7000
8000	81.578	82.597	83.617	84.637	85.656	86.676	87.696	88.716	89.735	90.755	8000
9000	91.775	92.794	93.814	94.834	95.854	96.873	97.893	98.913	99.933	100.952	9000
10000	101.972	102.992	104.011	105.031	106.051	107.071	108.090	109.110	110.130	111.149	10000

TORQUE

FOOT POUNDS TO KILOGRAMMETERS

ft. lbs.	0	1	2	3	4	5	6	7	8	9	ft. lbs.
	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	
—		0.138	0.277	0.415	0.553	0.691	0.830	0.968	1.106	1.244	—
10	1.383	1.521	1.659	1.797	1.936	2.074	2.212	2.350	2.489	2.627	10
20	2.765	2.903	3.042	3.180	3.318	3.456	3.595	3.733	3.871	4.009	20
30	4.148	4.286	4.424	4.562	4.700	4.839	4.977	5.115	5.253	5.392	30
40	5.530	5.668	5.807	5.945	6.083	6.221	6.360	6.498	6.636	6.774	40
50	6.913	7.051	7.189	7.328	7.466	7.604	7.742	7.881	8.019	8.157	50
60	8.295	8.434	8.572	8.710	8.848	8.987	9.125	9.263	9.401	9.540	60
70	9.678	9.816	9.954	10.093	10.231	10.369	10.507	10.646	10.784	10.922	70
80	11.060	11.199	11.337	11.475	11.613	11.752	11.890	12.028	12.166	12.305	80
90	12.442	12.581	12.719	12.858	12.996	13.134	13.272	13.410	13.549	13.687	90
100	13.826	13.964	14.102	14.240	14.379	14.517	14.655	14.793	14.932	15.070	100

KILOGRAMMETERS TO FOOT POUNDS

kg-m	0	1	2	3	4	5	6	7	8	9	kg-m
	ft. lbs.	ft. lbs.	ft. lbs.	ft. lbs.	ft. lbs.	ft. lbs.	ft. lbs.	ft. lbs.	ft. lbs.	ft. lbs.	
—		7.23	14.47	21.70	28.93	36.17	43.40	50.63	57.86	65.10	—
10	72.33	79.56	86.80	94.03	101.26	108.50	115.73	122.96	130.19	137.43	10
20	144.66	151.89	159.13	166.36	173.59	180.83	188.06	195.29	202.52	209.76	20
30	217.00	224.22	231.46	238.69	245.92	253.16	260.39	267.62	274.85	282.09	30
40	289.32	296.55	303.79	311.02	318.25	325.49	332.72	339.95	347.18	354.42	40
50	361.65	368.88	376.12	383.35	390.58	397.82	405.05	412.28	419.51	426.75	50
60	433.98	441.21	448.45	455.68	462.91	470.15	477.38	484.61	491.84	499.08	60
70	506.31	513.54	520.78	528.01	535.24	542.48	549.71	556.94	564.17	571.41	70
80	578.64	585.87	593.11	600.34	607.57	614.81	622.04	629.27	636.50	643.74	80
90	650.97	658.20	665.44	672.67	679.90	687.14	694.37	701.60	708.83	716.07	90
100	723.30	730.53	737.77	745.00	752.23	759.47	766.70	773.93	781.16	788.40	100

KILOGRAMMETERS TO NEWTONMETERS

kg-m	0	1	2	3	4	5	6	7	8	9	kg-m
	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	
—	—	9.81	19.61	29.42	39.23	49.03	58.84	68.65	78.45	88.26	—
10	98.07	107.87	117.68	127.49	137.29	147.10	156.91	166.71	176.52	186.33	10
20	196.13	205.94	215.75	225.55	235.36	245.17	254.97	264.78	274.59	284.39	20
30	294.20	304.01	313.81	323.62	333.43	343.23	353.04	362.85	372.65	382.46	30
40	392.27	402.07	411.88	421.69	431.49	441.30	451.11	460.91	470.72	480.53	40
50	490.33	500.14	509.95	519.75	529.56	539.37	549.17	558.98	568.79	578.59	50
60	588.40	598.21	608.01	617.82	627.63	637.43	647.24	657.05	666.85	676.66	60
70	686.47	696.27	706.08	715.89	725.69	735.50	745.31	755.11	764.92	774.73	70
80	784.53	794.34	804.15	813.95	823.76	833.57	843.37	853.18	862.99	872.79	80
90	882.60	892.41	902.21	912.02	921.83	931.63	941.44	951.25	961.05	970.86	90
100	980.67	990.47	1000.28	1010.08	1019.89	1029.70	1039.50	1049.31	1059.12	1068.92	100

NEWTONMETERS TO KILOGRAMMETERS

N-m	0	10	20	30	40	50	60	70	80	90	N-m
	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	kg-m	
—	—	1.020	2.039	3.059	4.079	5.099	6.118	7.138	8.158	9.177	—
100	10.197	11.217	12.236	13.256	14.276	15.296	16.315	17.335	18.355	19.374	100
200	20.394	21.414	22.433	23.453	24.473	25.493	26.512	27.532	28.552	29.571	200
300	30.591	31.611	32.630	33.650	34.670	35.690	36.710	37.729	38.749	39.768	300
400	40.789	41.808	42.827	43.847	44.867	45.887	46.906	47.926	48.946	49.965	400
500	50.986	52.005	53.024	54.044	55.064	56.084	57.103	58.123	59.143	60.162	500
600	61.183	62.202	63.221	64.241	65.261	66.281	67.300	68.320	69.340	70.359	600
700	71.380	72.399	73.418	74.438	75.458	76.478	77.497	78.517	79.537	80.556	700
800	81.577	82.596	83.615	84.635	85.655	86.675	87.694	88.714	89.734	90.753	800
900	91.774	92.793	93.812	94.832	95.852	96.872	97.891	98.911	99.931	100.950	900
1000	101.972	102.990	104.009	105.029	106.049	107.069	108.088	109.108	110.128	111.147	1000

A-8 CONVERSION TABLE

TEMPERATURE

FAHRENHEIT TO CENTIGRADE

°F	°C	°F	°C
-20	-28.9	90	32.2
-15	-26.1	95	35.0
-10	-23.3	100	37.8
-5	-20.6	105	40.6
0	-17.8	110	43.3
1	-17.2	115	46.1
2	-16.7	120	48.9
3	-16.1	125	51.7
4	-15.6	130	54.4
5	-15.0	135	57.2
10	-12.2	140	60.0
15	-9.4	145	62.8
20	-6.7	150	65.6
25	-3.9	155	68.3
30	-1.1	160	71.1
35	1.7	165	73.9
40	4.4	170	76.7
45	7.2	175	79.4
50	10.0	180	82.2
55	12.8	185	85.0
60	15.6	190	87.8
65	18.3	195	90.6
70	21.1	200	93.3
75	23.9	205	96.1
80	26.7	210	98.9
85	29.4	212	100.0

CENTIGRADE TO FAHRENHEIT

°C	°F	°C	°F
-30	-22.0	28	82.4
-28	-18.4	30	86.0
-26	-14.8	32	89.6
-24	-11.2	34	93.2
-22	-7.6	36	96.8
-20	-4.0	38	100.4
-18	-0.4	40	104.0
-16	3.2	42	107.6
-14	6.8	44	111.2
-12	10.4	46	114.8
-10	14.0	48	118.4
-8	17.6	50	122.0
-6	21.2	52	125.6
-4	24.8	54	129.2
-2	28.4	56	132.8
0	32.0	58	136.4
2	35.6	60	140.0
4	39.2	62	143.6
6	42.8	64	147.2
8	46.4	66	150.8
10	50.0	68	154.4
12	53.6	70	158.0
14	57.2	75	167.0
16	60.8	80	176.0
18	64.4	85	185.0
20	68.0	90	194.0
22	71.6	95	203.0
24	75.2	100	212.0
26	78.8		